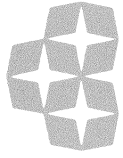


RE-630ME



**SAMSUNG**

# MICROWAVE OVEN

## Service Manual

### 0.9 cu.ft.

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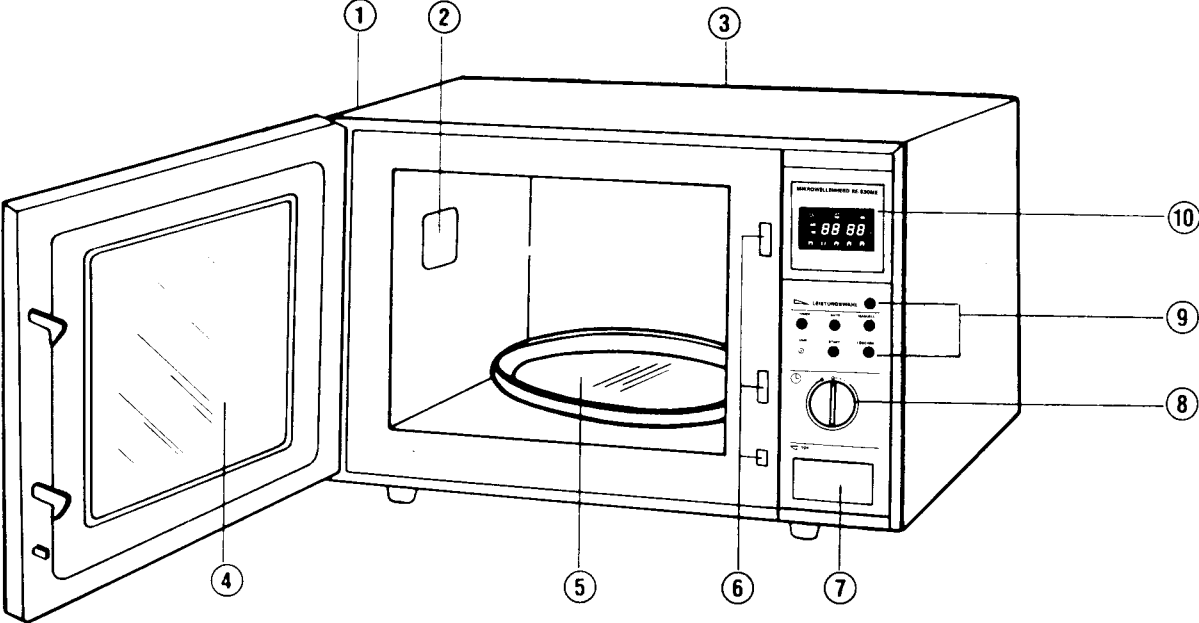
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## SPECIFICATIONS

Power Source:	220V~50Hz Single Phase
Power Consumption:	1,150W (5.0A)
Power Output:	65-650W/ 5 Level Power
Working Frequency:	2450 MHz
Timer:	59 Minutes 59 Seconds
Cooling Method:	Air Cooling
Outside Dimensions :	Length; 528mm Width ; 415mm High ; 340mm
Oven Cavity Dimensions :	Length; 330mm Width ; 360mm High ; 228mm
Shipping Weight :	Approx. 23.5 kg

FEATURE DIAGRAM



1. Access door for oven lamp.

2. Interior oven lamp.

3. Ventilation openings in the rear panel of the oven.

4. Oven door with see through window for easy viewing of food being cooked.

5. Removable 318mm diameter special glass. turntable for even cooking and easy cleaning.
6. Two door latches and safety interlocks.

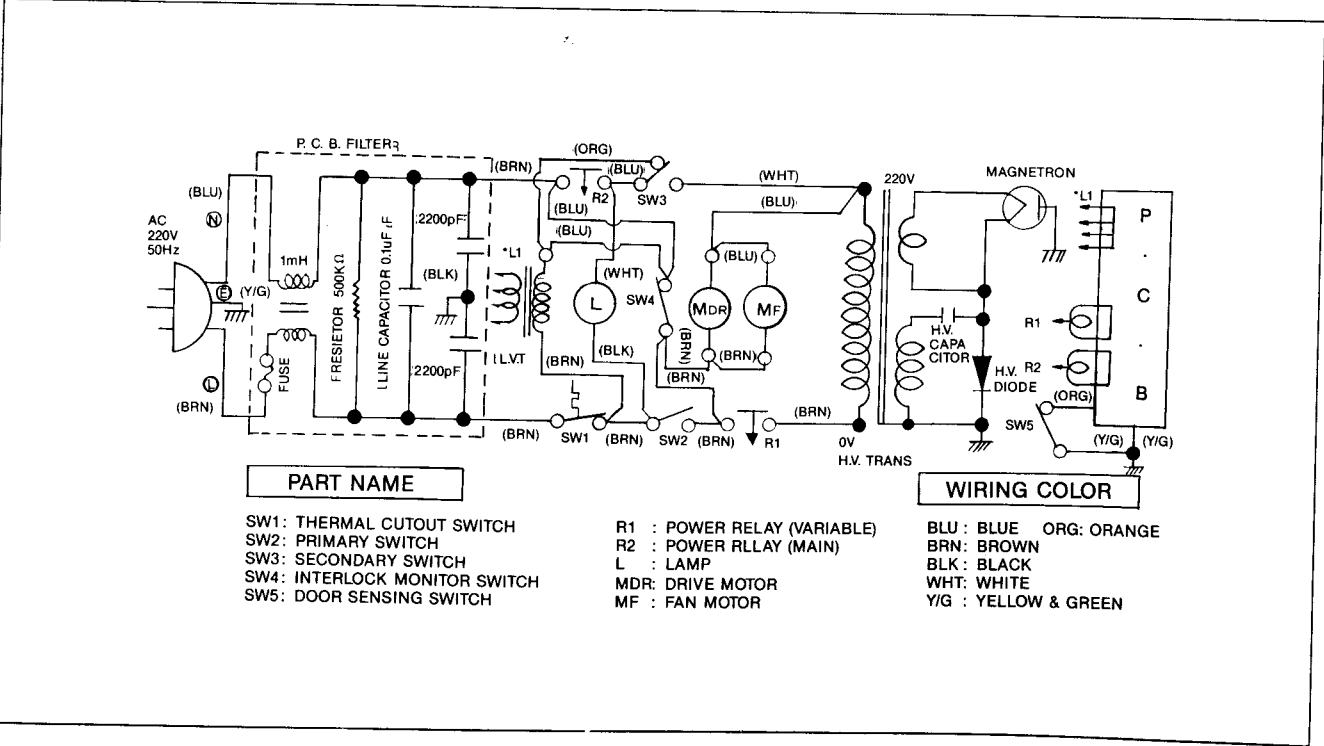
7. DOOR OPEN button  
Depress button to open the door

8. TIMER

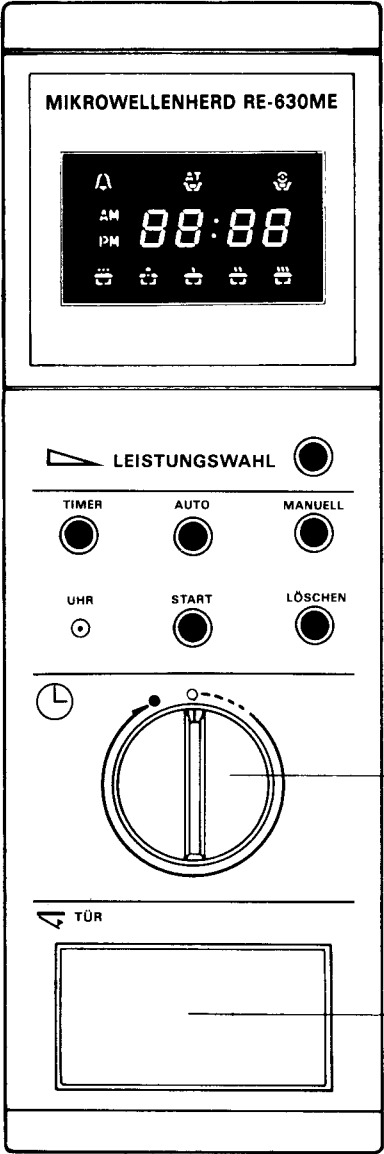
9. Function Selector Button

10. Display

WIRING DIAGRAM



CONTROL PANEL



- DIGITAL DISPLAY AND INDICATOR LIGHTS

\* Function Indicator Lights  
indicate which cooking function is being set or used.

\* Digital Display  
shows time of day, time left to cook. AM, PM.

\* Power Indicator Light  
indicates which power is being set or used.
- FUNCTION SELECTOR BUTTON

\* Clock Set

\* Power Level Select

\* Auto Time Cook and Manual Time Cook

\* Delay Start

\* Start and Cancel
- TIMER KNOB

\* Turn to set cook time or clock
- DOOR OPEN BUTTON

\* Push to open door  
—To stop the oven  
—To put food on turntable in oven.  
—To take out food.

# CIRCUIT DESCRIPTION

Refer to the wiring diagram on page 2.

## 1. When the food is placed inside the oven and the door is closed.

- (A) Low voltage transformer supplies the necessary voltage to the touch control circuit when power cord is plugged in.
- (B) The contacts of the primary interlock switch and secondary interlock switch close.
- (C) The contacts of the interlock monitor switch open. This interlock monitor switch acts to slow blow 8A fuse and stop magnetron oscillation when the door is opened during operation under an abnormal condition (i.e. both the contacts of primary interlock switch and secondary interlock switch do not open the circuit to stop oscillation).
- (D) The Door key is caught by the door hook, the contacts of primary switch and secondary switch close the primary circuit and the contacts of door sensing switch close, to give touch control circuit the information that the door is closed.

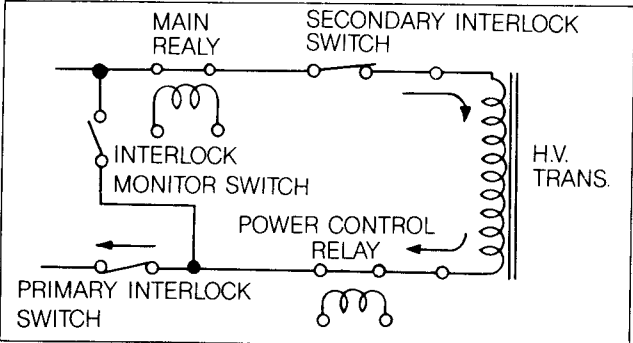
## 2. When cooking cycle, power and time are set by pressing the function buttons and turns the timer knob.

- (A) Cooking function indicator located on the Display Window turns ON to indicate that function has been set.
- (B) The time you set appears in the display window.
- (C) The touch control circuit stores the cooking data you set.

## 3. When the START button is pressed.

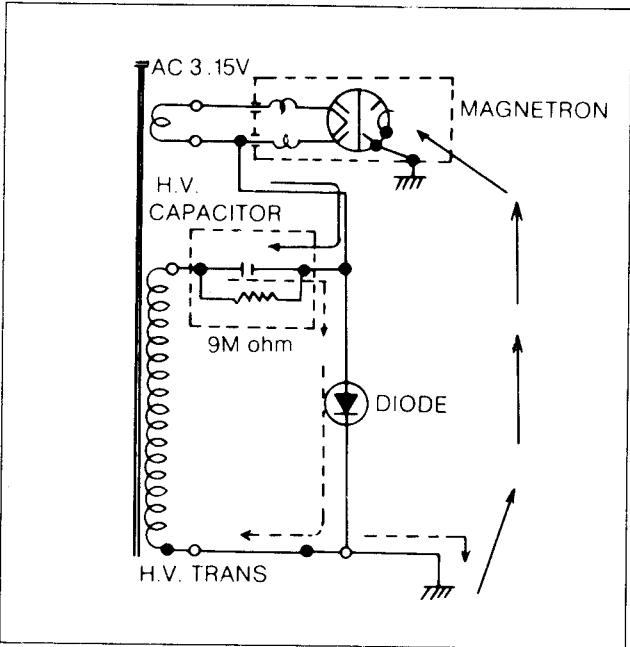
The power control relay and main relay are controlled by the touch control circuit.

- (A) An oven lamp lights the inside of the oven by operation of the main relay in the Touch Control Circuit.
- (B) Fan motor rotates and cools the magnetron by blowing the air coming from the intake on the back panel over the magnetron fins. After cooling the fins, this air is directed into the oven to blow out the vapor.
- (C) 220VAC is applied to the high voltage transformer through the contacts of primary and secondary switches shown by the solid line just after the power control relay turns ON. (See Fig. 1)



(Fig. 1)

- (D) 3.15V AC is generated from the filament winding of the high voltage transformer. This 3.15V is applied to the magnetron to heat the magnetron filament through two noise preventing choke coils.
- (E) A high voltage of 2,150 volts AC is generated in the secondary of the high voltage transformer and this secondary voltage is increased by the action of the diode and the charging of the high voltage capacitor. This resultant DC voltage is then applied to the anode of the magnetron. As shown in Fig. 2 the first half cycle of the high voltage produced in the high voltage transformer secondary charges the high voltage capacitor.



(Fig. 2)

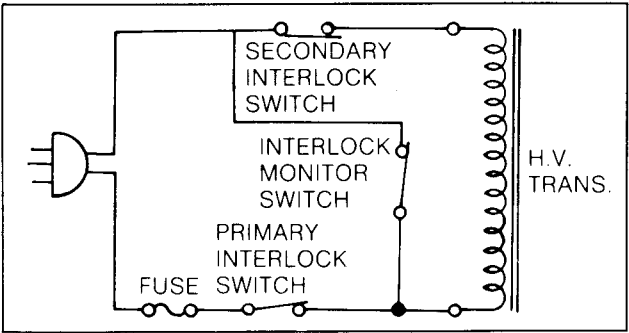
Current flow is in the direction of the dotted-line. During the second half cycle, the voltage produced by the transformer secondary, and the charge of the high voltage capacitor are combined and applied to the magnetron as shown by the solid line so that oscillations begin. The disturbance wave generated by the magnetron is prevented by the choke coils of 1.5μH, filter capacitors of 500pF and the magnetrons shielded case so that TV and radio programs are not impaired by noise.

- (F) The power control relay is turned on intermittently by the touch control circuit, when the oven is set at any power selection except for Full power. The touch control circuit controls the ON-OFF time of the power control relay in order to vary the output power of the microwave oven from "LOW" to "Full" power. One complete ON and OFF cycle of the power control is 30 seconds. The relation between indications on the control panel and the output of the microwave oven is on the page. 17.

- (G) The cooking time shown in the display starts to count down.

## 5. When the door is opened during cooking.

- (A) Primary interlock switch and secondary interlock switch are opened to cut off the primary voltage of the high voltage transformer to stop microwave oscillation.
- (B) Door sensing switch is shorted to give the door open information to touch control circuit. The contacts of the main relay open, the power control relay turns OFF and the display stops counting down.
- (C) Fan motor and turn-table motor stop by operation of the main relay in the Touch Control Circuit. But the cavity light lights the inside of the oven again until the door is closed.
- (D) As soon as the door begins to open, the contacts of primary interlock switch, secondary interlock switch open and the contacts of interlock monitor switch close the short circuit.
- (E) If the contacts of primary interlock switch malfunction the 8A fuse blows open due to the large current surge caused by the monitor switch activation, and this in turn stops magnetron oscillation (Fig. 3).



(Fig. 3)

## 6. When the CANCEL button is pressed during cooking.

- (A) CANCEL button pressing twice cancels all programs stored in the touch control circuit. The time of day reappears in display window.
- (B) The oven lamp and cooking indicators turn off.
- (C) The fan motor stops.
- (D) The power control relay turns off to cut primary voltage to high voltage transformer causing magnetron to stop microwave oscillation.

## CAUTIONS TO BE OBSERVED WHEN TROUBLESHOOTING

UNLIKE MANY OTHER APPLIANCES THE MICROWAVE OVEN IS HIGH VOLTAGE HIGH CURRENT EQUIPMENT THOUGH IT IS FROM DANGER IN ORDINARY USE EXTREME CARE SHOULD BE TAKEN DURING REPAIR.

### WARNING

PLACEMAKER WEARERS MUST CONSULT THEIR PHYSICIAN BEFORE ATTEMPTING SERVICE.

### CAUTION

SERVICEMEN SHOULD REMOVE THEIR WATCHES WHENEVER WORKING CLOSE TO OR REPLACING THE MAGNETRON.



### CAUTION

SERVICEMEN SHOULD REMOVE THEIR WATCHES WHENEVER WORKING CLOSE TO OR REPLACING THE MAGNETRON.

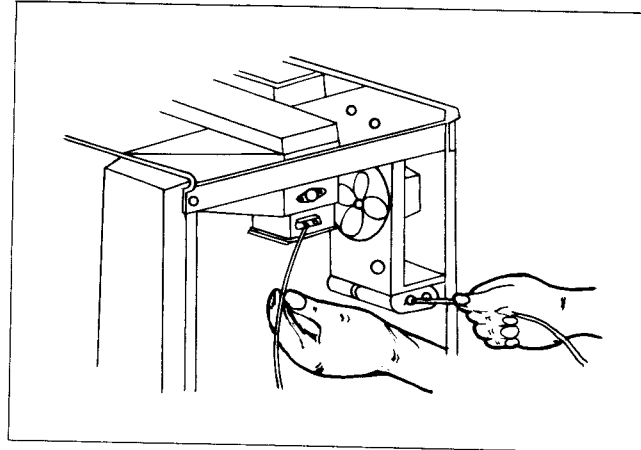
### IMPORTANT

#### 1. Check the earthing.

Do not operate on a 2-wire extension cord. The microwave oven is designed to be used when earthed. It is imperative therefore, to make sure it is earthed properly before beginning repair work.

#### 2. Warning about the electric charge in the high voltage capacitor.

For about 30 seconds after the operation stops, an electric charge remains in the high voltage capacitor. When replacing or checking parts, short between the oven chassis and the negative high terminal of the high voltage capacitor, by using a properly insulated jumper wire.



(Fig. 4)

### WARNING

THERE IS HIGH-VOLTAGE PRESENT, WITH HIGH-CURRENT CAPABILITIES IN THE CIRCUITS OF THE HIGH VOLTAGE TRANSFORMER SECONDARY AND FILAMENT TRANSFORMER SECONDARY. IT IS EXTREMELY DANGEROUS TO WORK ON OR NEAR THESE CIRCUITS WITH THE OVEN ENERGIZED.

#### 3. When parts be replaced, must remove the power plug from the outlet.

#### 4. When the 8 Amp fuse is blown due to the operation of the Interlock Monitor Switch:

- (A) Replace the primary interlock switch and interlock monitor switch. This is mandatory. Refer to page 12 for the measurement and adjustments for these switches.
- (B) When replacing the fuse, confirm that it has the appropriate rating for this model.

#### 5. Avoid inserting nails, wire, etc. through any holes in the units during operation.

Never insert a wire, nail or any other metal object through the lamp holes on the cavity or any other holes or gaps, because such objects may work as an antenna and cause microwave leakage.

#### 6. Pacemaker wearers should consult their physician before attempting to service or repair a microwave oven. For additional information on this subject, write to: the manufacturer of your pacemaker.

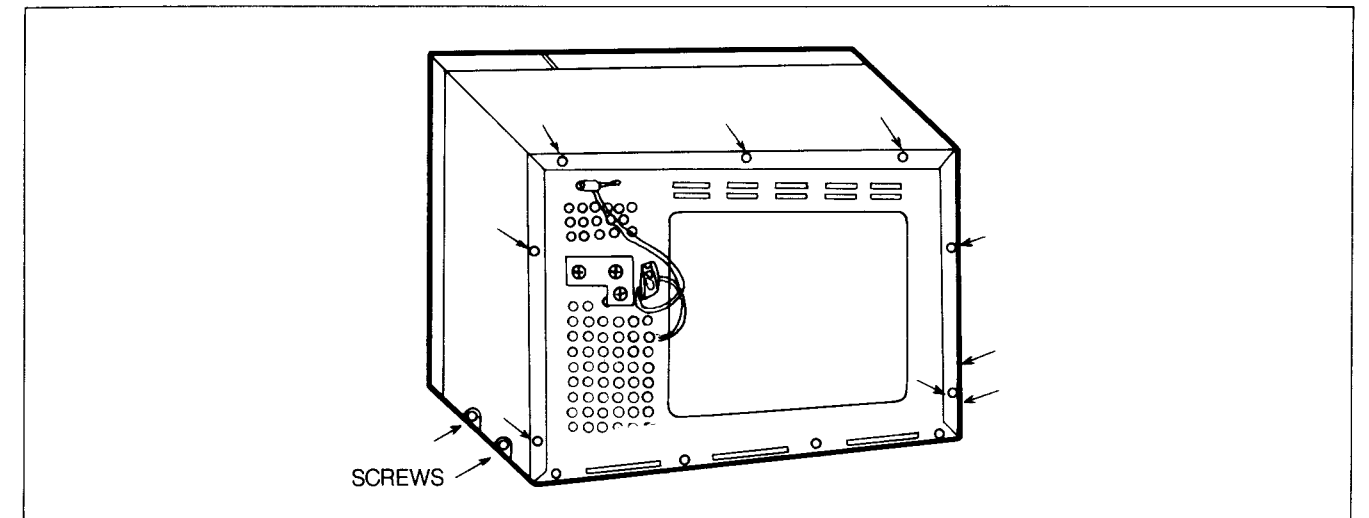
#### 7. Confirm after repair.

- (A) After repair of replacement of parts, make sure that the screws of the oven, are neither loose nor missing, microwaves might leak if screws are not properly tightened.
- (B) Make sure that all electrical connections are tight before inserting the plug into the wall outlet.
- (C) Check for radiation leakage. (Refer to procedure for measuring radiation leakage page 14).

## DISASSEMBLY AND PARTS REPLACEMENT PROCEDURE

### 1. Removal of outer panel

Remove the four screws from both side section and the seven screws from the rear section. The outer panel can now be lifted off with a slight pulling backward. (Fig. 5).



(Fig. 5)

### 2. Replacement of the magnetron.

### CAUTION

SERVICEMEN SHOULD REMOVE THEIR WATCHES WHENEVER WORKING CLOSE TO OR REPAIRING THE MAGNETRON.

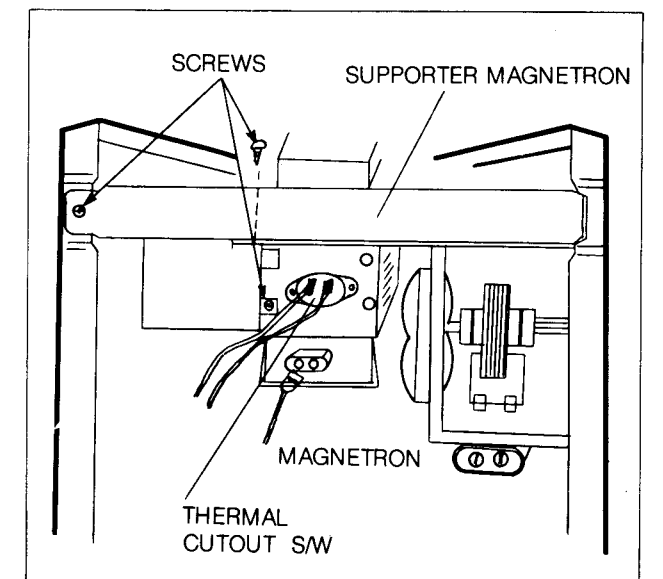
Remove the magnetron with the shielded case, permanent magnet, choke coils and 500pF capacitors because they are one assembly.

Discharge the high voltage capacitor. (See page 6).

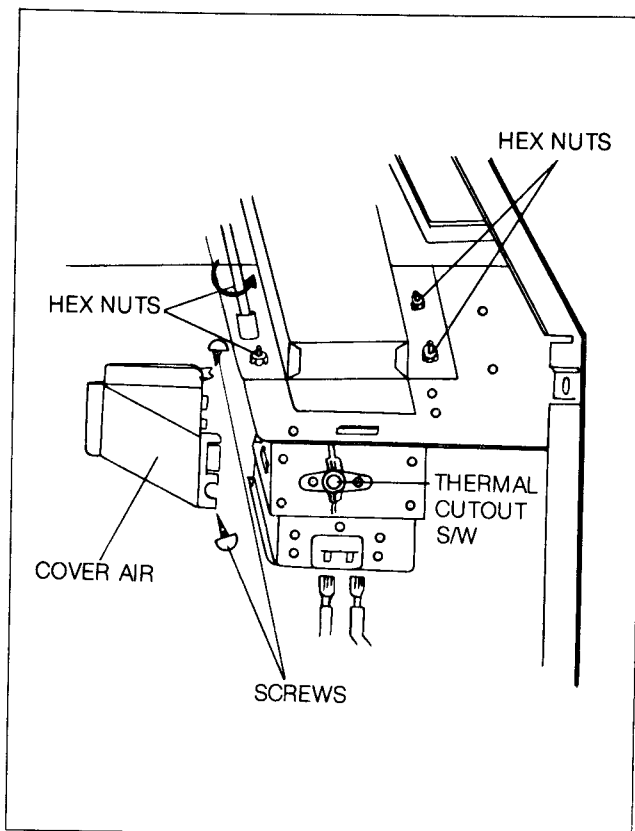
- (A) Disconnect all lead wires from the magnetron.
- (B) Remove 2 screws securing the supporter magnetron (Fig. 6).
- (C) Remove the supporter magnetron.
- (D) Remove 2 screws securing the thermal switch.
- (E) Remove 2 screw securing the cover air (Fig. 7).
- (G) Remove 4 hex nuts securing the magnetron to the wave guide (Fig. 7).
- (H) Take out the magnetron VERY CAREFULLY.

#### NOTE

- (A) When removing the magnetron, make sure that its dome does not hit any adjacent parts or it may be damaged.
- (B) When replacing the magnetron, be sure to remount the magnetron gasket in correct position and be sure that the gasket is in good position.



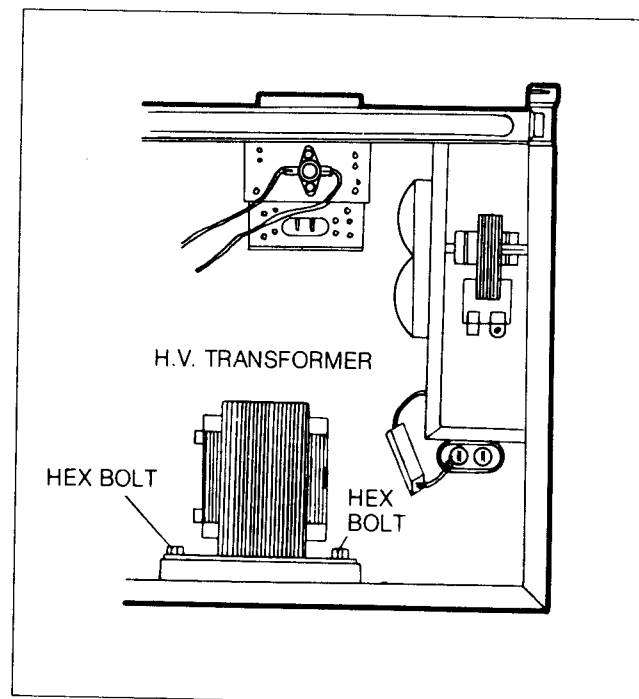
(Fig. 6)



(Fig. 7)

### 3. Replacement of the high voltage transformer.

- Discharge the high voltage capacitor (see page 6).
- Disconnect all the high voltage transformer leads.
- Remove the four mounting bolts of the high voltage transformer (Fig. 8).
- When replacing connect the leads correctly and firmly.



(Fig. 8)

### 4. Replacement of the door assembly.

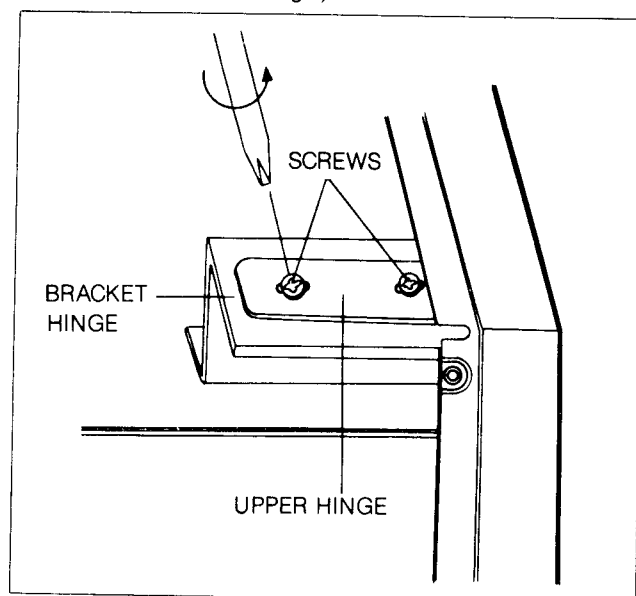
- Remove 2 hex bolts securing the upper hinge. Then, remove the door (Fig. 9).

#### NOTES

—After replacing the door, be sure to check that the primary interlock switch, the secondary interlock switch, and the interlock monitor switch operate normally.

—Microwave emission should be within the limit of  $5\text{mW}/\text{cm}^2$ .

(All service adjustments should be made for minimum, R.F. emission readings.)



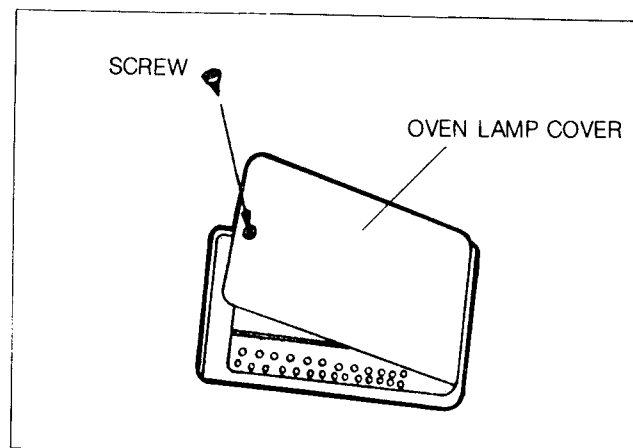
(Fig. 9)

### 5. Replacement of the oven lamp.

This replacement may be made by the customer.

- Remove one screw holding the lamp cover in place on left side of the outer panel.
- Remove the lamp cover.
- Remove the oven lamp by turning it counter-clockwise and replace only with 220V/20W lamp.

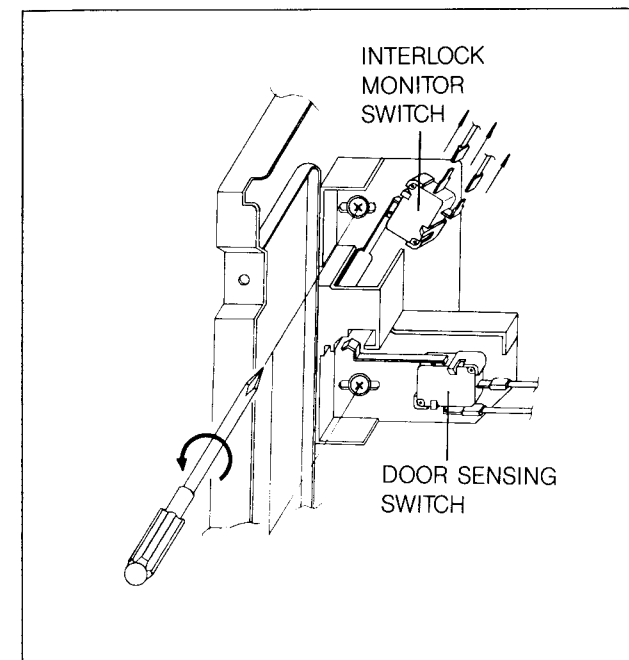
CAUTION: Before replacing any lamp, disconnect electric power cord at wall outlet or circuit breaker. Let lamp (or bulb) and lamp cover cool completely.



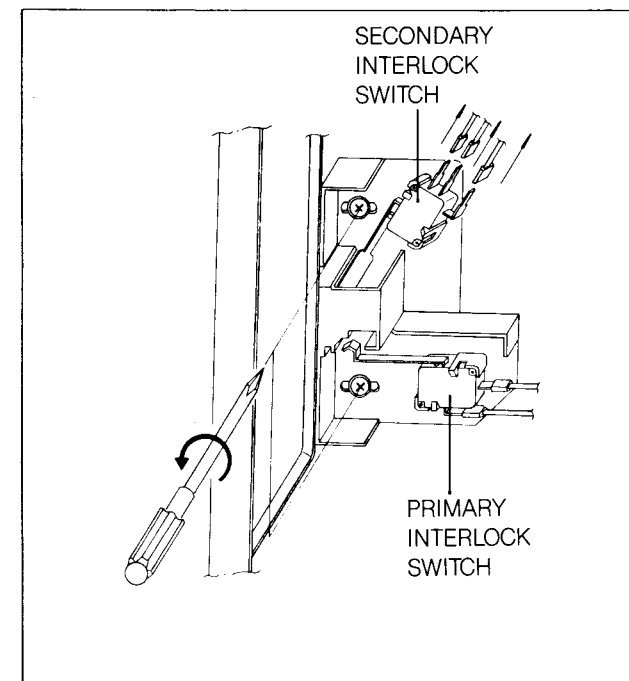
(Fig. 10)

### 6. Replacement of the interlock monitor switch and door sensing switch.

- Disconnect all lead wires from interlock monitor switch and door sensing switches.
- Push up the mounting tabs which are supporting the interlock monitor switch. (Fig. 11)
- Push up the mounting tabs which are supporting the door sensing switch. (Fig. 11)
- Make necessary adjustments and microwave emission check according to "MEASUREMENT AND ADJUSTMENTS" on page 12, after it is repaired or replaced with new one.



(Fig. 11)



(Fig. 12)

### 7. Replacement of the secondary interlock switch and primary interlock switch.

- Disconnect all the lead wires from the secondary interlock switch and primary interlock switch.
- Push up the mounting tabs which are supporting the secondary interlock switch. (Fig. 12)
- Push up the mounting tabs which are supporting the primary interlock switch. (Fig. 12)
- Make necessary adjustments and microwave emission check according to "MEASUREMENT AND ADJUSTMENTS" on page 12, after it is repaired or replaced with new one.

Interlock Switch Replacement—In replacing faulty switches, be sure mounting tabs are not bent, broken or otherwise deficient in their ability to secure the switches in place.

### 8. Replacement of the fuse

- Remove the 8-ampere fuse with a screwdriver.

#### NOTES

—When replacing the 8A fuse, be sure to use an exact repair part.

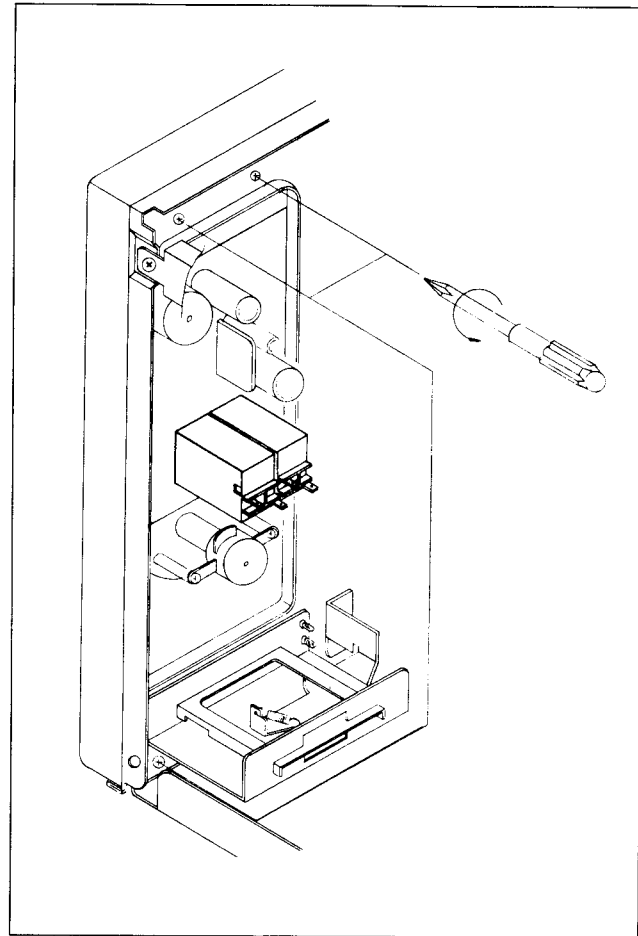
—If new 8A fuse opens immediately, check the primary interlock switch, and interlock monitor switch.

—If the primary interlock switch is defective, replace not only the primary interlock switch but also the interlock monitor switch. Then install a new 8A fuse.

### 9. Replacement of the control circuit board.

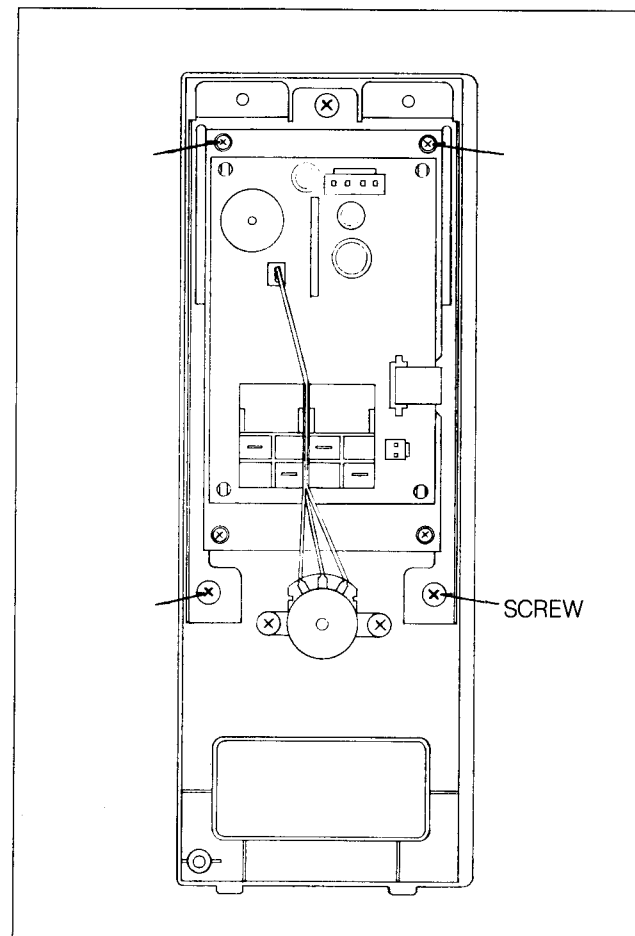
NOTE: Be sure to ground any static electric charge in your body to an earth and do not touch any of the touch controls circuitary.

- (A) Disconnect the connectors from the control circuit board. (Fig. 13).

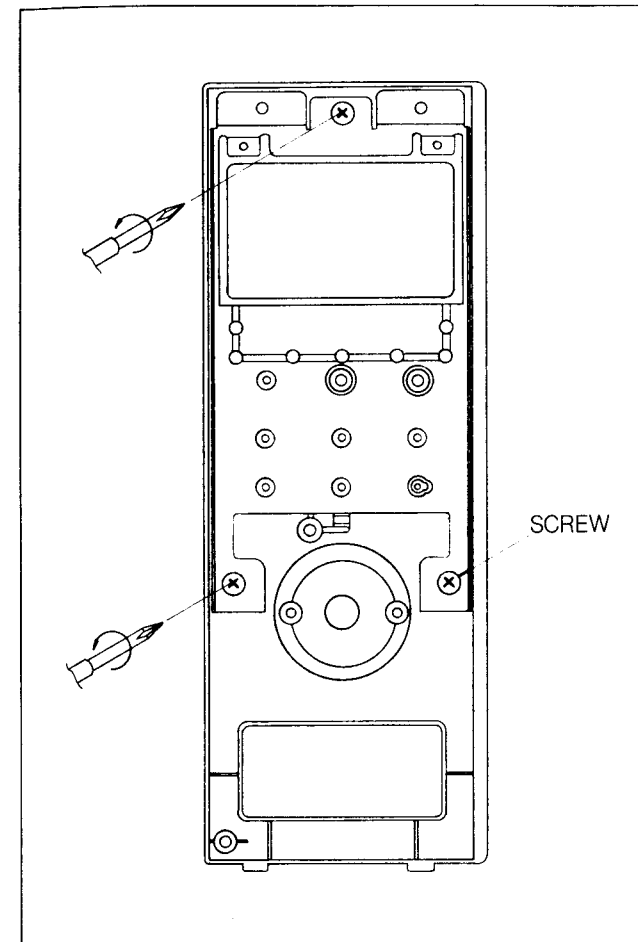


(Fig. 13)

- (B) Remove 3 screws securing the control box assembly (Fig. 13).  
 (C) Remove 4 screws securing the control circuit board (Fig. 14).  
 (D) Lift up the control circuit board from the control box assembly.



(Fig. 14)



(Fig. 15)

### 10. Replacement of function select button

- (A) Follow steps A through D given in above NO. 9 paragraph.  
 (B) Remove 3 screws securing the function select button (Fig. 15).

# MEASUREMENTS AND ADJUSTMENTS

## WARNING

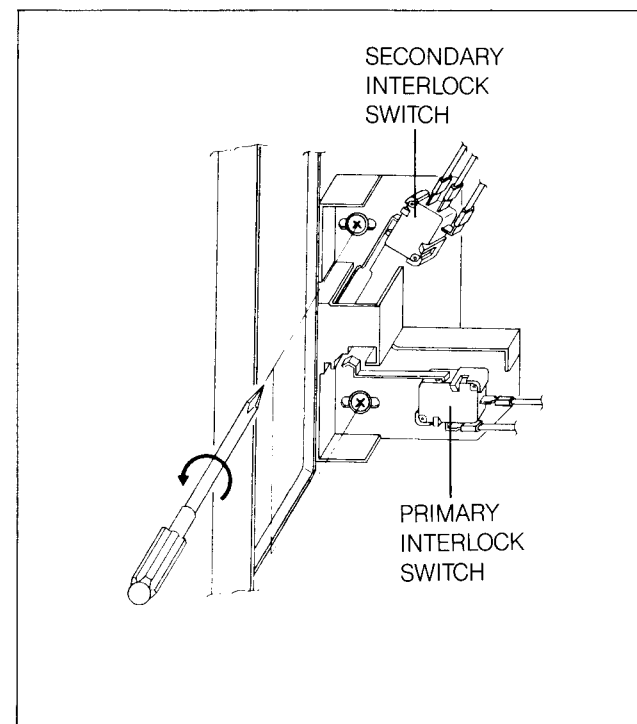
FOR CONTINUED PROTECTION AGAINST RADIATION HAZARD, REPLACE ONLY WITH IDENTICAL REPLACEMENT PARTS AND BE SURE TO USE THE CORRECT PART NUMBER FOR THE FOLLOWING SWITCHES: PRIMARY, SECONDARY AND INTERLOCK MONITOR SWITCHES.

WHEN THE 8 AMP FUSE IS BLOWN OUT DUE TO THE OPERATION OF INTERLOCK MONITOR SWITCH, YOU MUST REPLACE PRIMARY INTERLOCK SWITCH AND INTERLOCK MONITOR SWITCH. THEN FOLLOW THE ADJUSTMENT PROCEDURES BELOW.

AFTER COMPLETING NECESSARY REPAIR AND ADJUSTMENT, BE SURE TO CHECK THE CONTINUITY OF PRIMARY INTERLOCK SWITCH AND INTERLOCK MONITOR SWITCH.

### 1. Adjustment of primary interlock switch and secondary interlock switch (Fig. 16).

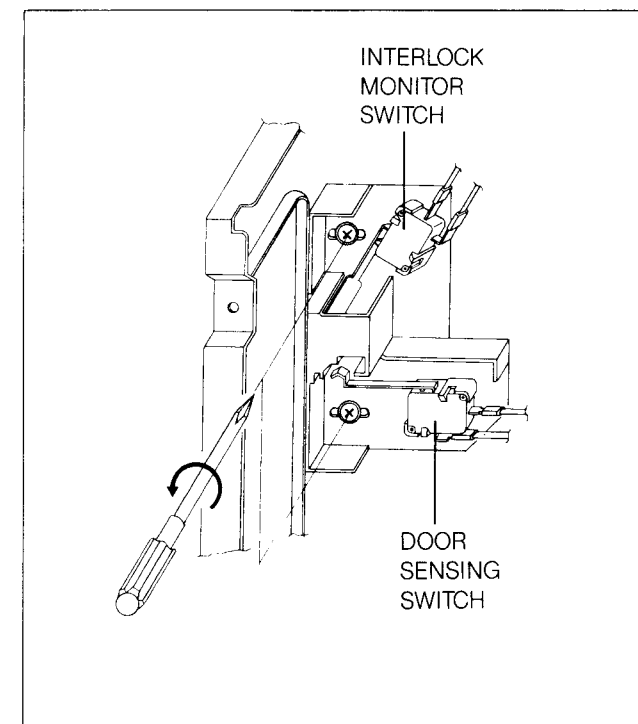
- Loosen two screws securing the body latch switch and adjust the switch body position so that the interlock monitor switch opens before the primary interlock switch and secondary interlock switch close when the door is closed tightly against the oven cavity front.
- Fasten the screws tightly.
- Make sure the energy leakage is within the limit of the regulation ( $5\text{mW}/\text{cm}^2$ ) when measured by a detector. (All service adjustments should be made for minimum R.F. emission readings.)



(Fig. 16)

### 3. Adjustment of interlock monitor switch and door sensing switch (Fig. 17).

- Loosen two screws securing the body latch switch and adjust the switch body position so that the interlock monitor switch opens before the door sensing switch opens when the door is closed tightly against the oven cavity front.
- Fasten the screws tightly.
- Make sure the energy leakage is within the limit of the regulation ( $5\text{mW}/\text{cm}^2$ ) when measured by a detector. (All service adjustments should be made for minimum R.F. emission readings.)



(Fig. 17)

**Interlock Switch Replacement**—In replacing faulty switches, be sure mounting tabs are not bent, broken or otherwise deficient in their ability to secure the switches in place.

### 4. Measurement of the Magnetron's Output

The output power of the magnetron can be measured by performing a simple water temperature rise test. Equipment needed for the test:

- Two 1-liter beakers.
- One glass thermometer

NOTE: Check the line voltage under load. Low voltage will lower the magnetron output. Make all temperature and time tests with accurate equipment.

- Fill the two 1-liter beakers with water and mark one A and the other B.
- Stir the water in each beaker with the thermometer and record each beaker's temperature.  
Beaker A's temperature=T1A  
Beaker B's temperature=T1B
- The average value (T1) of T1A and T1B is calculated as follows:

$$T1 = \frac{T1A + T1B}{2}$$

- Place both beakers on the center of the cooking tray. Set the oven for high power and set two minutes. Heat the water for exactly two minutes.

- When the heating is finished, again stir the water with the thermometer and measure the temperature rise as T2A and T2B.

- The average value (T2) of T2A and T2B is calculated as follows:

$$T2 = \frac{T2A + T2B}{2}$$

- Subtract T1 from T2. This will give you the temperature rise.

- The normal temperature rise for this model is  $14^{\circ}\text{F}$  to  $18^{\circ}\text{F}$  ( $8^{\circ}\text{C}$  to  $10^{\circ}\text{C}$ ) at the "HIGH" power setting.

NOTE 1: Variation or errors in the test procedure will cause a variance in the temperature rise. Additional power test should be made if temperature rise is marginal.

NOTE 2: Output power in watts is computed by multiplying the temperature rise (step G) by a power factor of 70 in case of centigrade.

NOTE 3: In order to determine (not to measure the output power) if oven oscillates normally or not, perform the following magnetron test.

### Magnetron Test Procedure

You may conduct test simply by heating one liter of water for two minutes. In this case you can not compute the output power in watts as above method due to microwave characteristic and the temperature rise should be over  $14^{\circ}\text{C}$  ( $25^{\circ}\text{F}$ ).

## CAUTION MICROWAVE RADIATION

PERSONNEL SHOULD NOT BE EXPOSED TO THE MICROWAVE ENERGY WHICH MAY RADIATE FROM THE MAGNETRON OR OTHER MICROWAVE GENERATING DEVICE IF IT IS IMPROPERLY USED OR CONNECTED. ALL INPUT AND OUTPUT MICROWAVE CONNECTIONS, WAVEGUIDE, FLANGES, AND GASKETS MUST BE SECURE. NEVER OPERATE THE DEVICE WITHOUT A MICROWAVE ENERGY ABSORBING LOAD ATTACHED. NEVER LOOK INTO AN OPEN WAVEGUIDE OR ANTENNA WHILE THE DEVICE IS ENERGIZED.

# PROCEDURE FOR MEASURING MICROWAVE ENERGY LEAKAGE

## Equipment

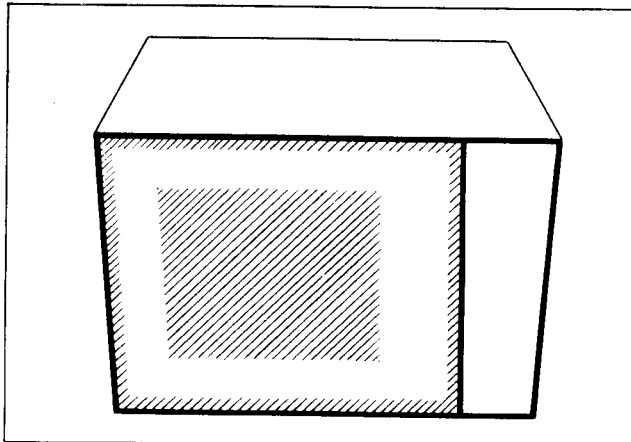
Microwave Energy Survey Meter  
600cc glass beaker  
Alcohol thermometer 100°C or 202°F.

### 1. Procedure for measuring Microwave Energy Leakage.

- Pour  $275 \pm 25$ cc of  $20 \pm 5^\circ\text{C}$  ( $68 \pm 9^\circ\text{F}$ ) water in a beaker which is graduated to 600cc, and place the beaker in the center of the oven.
- Start the oven and measure the leakage by using a microwave energy survey meter.
- On survey meters with dual ranges, set to 2450MHz.
- When measuring the leakage, always use the 2-inch spacer cone with the probe. Hold the probe perpendicular to the cabinet door. Place the spacer cone of the probe on the door and/or cabinet door seam and move along the seam, the door viewing window, the exhaust opening and move the probe in a counter-clockwise direction at a rate of 1 inch/sec. If the leakage of the cabinet door seam is unknown move the probe more slowly. When testing near a corner of the door, keep the probe perpendicular to the areas, making sure the probe end at the base of the cone does not get closer than 2 inches from any metal. If it does, erroneous reading may result.
- Measured radiation leakage must be less than  $5\text{mW}/\text{cm}^2$  after repair or adjustment.

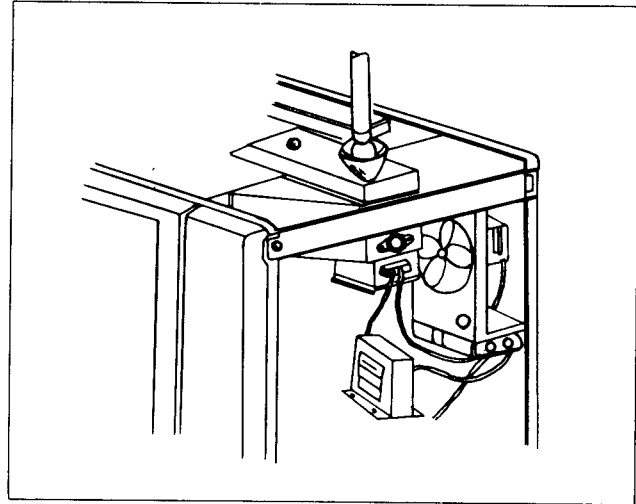
### 2. Microwave Energy Leakage Check With Cabinet Removed.

- Remove cabinet as described in step 1 on page 7.
- Pour  $275 \pm 25$ cc of  $20 \pm 5^\circ\text{C}$  ( $68 \pm 9^\circ\text{F}$ ) water in a beaker which is graduated to 600cc, and place the beaker in the center of the oven.



(Fig. 18)

- Start the oven at High power.
- On survey meter with dual ranges, set to 2450MHz.
- Using the surveymeter and space cone as described above, measure around the magnetron opening area, the surface of the air guide and the surface of the waveguide, shown in Fig. 19 but avoid the high voltage components. The meter should read less than  $5\text{mW}/\text{cm}^2$ .



(Fig. 19)

**WARNING**  
**AVOID THE HIGH VOLTAGE COMPONENTS**

### 3. Note when measuring.

- Do not exceed full scale deflection.
- The test probe must be held by the grip portion of the handle, otherwise a false reading may result if the operator's hand is between the handle and the probe.
- When high leakage is suspected, do not move the probe horizontally along the oven surface: this may possible cause probe damage.
- Follow the recommendations of the manufacturer of the Microwave Energy Survey Meter.

### 4. Record keeping and notification after measurement

- After adjustment and repair of the radiation preventing device, make a repair, record the measured values, and keep the data.
- Should the radiation leakage be more than  $5\text{mW}/\text{cm}^2$  after determining that all parts are in good condition, functioning properly, and genuine replacement parts as listed in this manual have been used, immediately notify:

Samsung Electronics GmbH  
Daimlerstr. 6  
6374 Steinbach  
Tel. 06171/73094

### 5. At least once a year have the Microwave energy Survey Meter checked for accuracy by its manufacturer

# PROBLEMS NOT RELATED TO DEFECTS OF OVEN

When you get complaint from your customer, please investigate the complaint carefully before going to the customer's home. If the following symptoms apply, please educate the customer in the proper use of the microwave oven in order to eliminate an unnecessary service call.

CONDITION	CAUSE	REMEDY
Microwave oven does not work.	Inserting many plugs into one plug receptacle and using them at the same time causes over loading.	Avoid using other electrical appliances when you use the microwave oven.
	Microwave oven plug is not inserted tightly.	Insert microwave oven plug tightly.
Output power is too low.	Lower power voltage	Use the microwave oven at adequate line voltage.
	Food temperature is too low	This is not, in reality a problem. Therefore please expect to cook a little longer
Sparks occurring	Using metallic ware and allowing it to touch the oven wall	Do not use metallic ware for cooking except where noted in the cook book
	Ceramic ware trimmed in gold or silver powder is used	Do not use any type of cookware with metallic trimming
Uneven cooking	Inconsistent intensity of microwave by it's characteristics	<ol style="list-style-type: none"> <li>Wrap the thinner part with aluminum foil.</li> <li>Use plastic wrap or cover with a lid.</li> <li>Stir once or twice while cooking such as soup, cocoa or milk.</li> </ol>

# TROUBLESHOOTING GUIDE OF TOUCH CONTROL CIRCUIT

Follow the procedure below to check if the touch control circuit is defective or not.

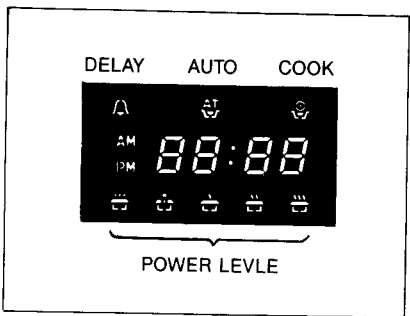
1. Check earthing before checking for trouble.
2. Be careful of the high voltage circuit.
3. Discharge the high voltage capacitor (see page 6).
4. When checking the continuity of the switches or transformer, disconnect one lead wire from those parts and then check continuity without turning the power source on. To do otherwise may result in a false reading or damage to your meter.
5. Do not touch any part of the circuitry or the touch control circuit board, since static electric discharge may damage this control panel. Always touch earth while working on this panel to discharge any static charge built up in your body.

[TROUBLE 1] The following visual conditions indicate a probable defective touch control circuit.

1. Incomplete segments.  
(A) Segment missing.  
(B) Partial segments missing.  
(C) Digit flickering.

NOTE: Other than normal fluorescent slight flickering.  
(D) Colons do not turn on.

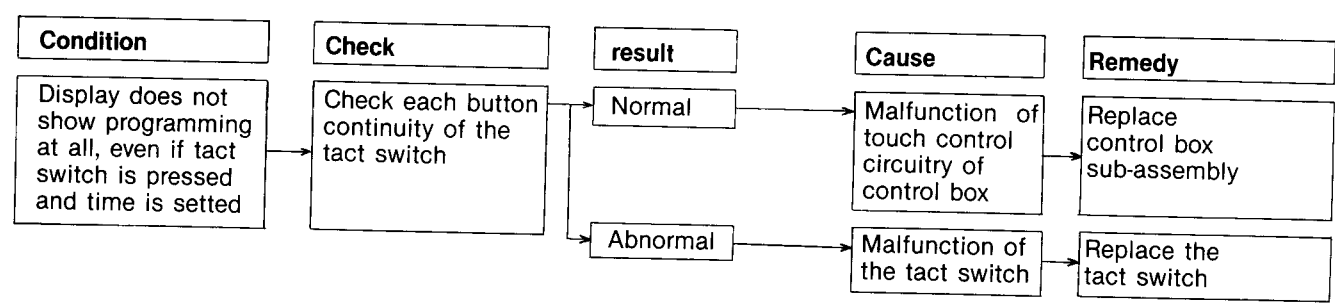
2. A distinct change in the brightness of one or more numbers in the display.
3. One or more digits in the display not lighting when they should.
4. No indicator lamps for the cooking function selected.
5. Specific numbers (for example 2 or 3) with not display when the timer knob turns.
6. Display does not count down or up with time cooking or clock operation.
7. Display obviously jumps in time while counting down.
8. Display counts down noticeably too fast while cooking.
9. Display can not shift from first stage cooking to the second stage cooking while AUTO TIME COOK.



(Fig. 20)

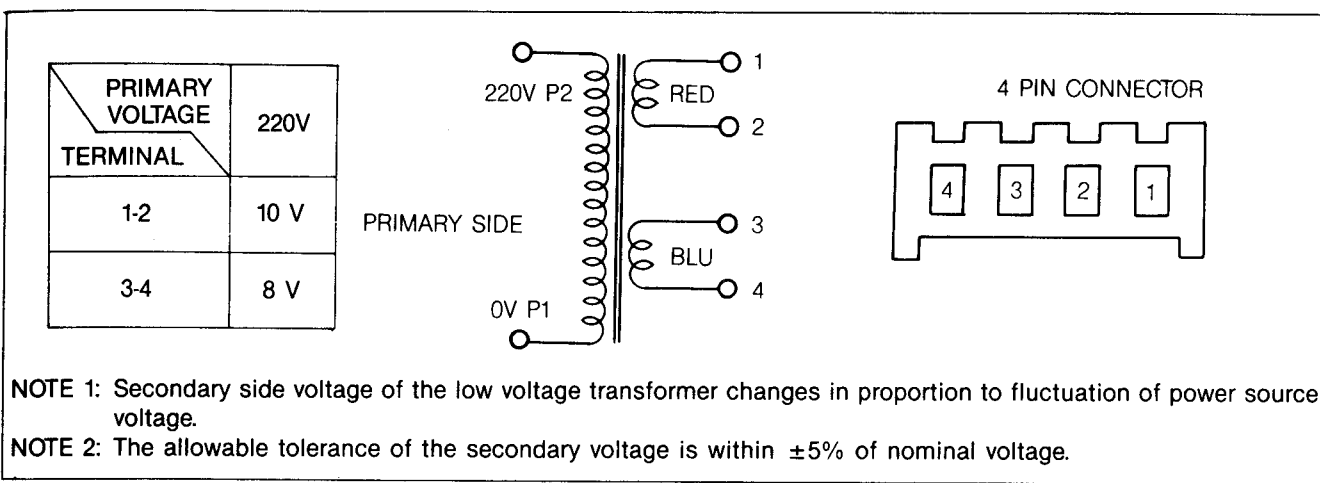
10. Display continues counting down with time cooking when door open button is pressed during cooking check if door sensing switch shorts when door open button is pressed. If door sensing switch is normal, replace touch control circuit.
11. The time of day in the display does not reappear when the CANCEL button is pressed twice.
12. Oven lamp and fan motor do not stop although cooking is finished. Replace touch control circuit.

[TROUBLE 2] DIGITAL Readout Display does not show programming, even if the function select button is pressed and timer knob is turned.



NOTE Before following the particular steps listed above in trouble shooting guide for the tact switches's failure, please check for the continuity of each tact switch and control box subassembly.

[TROUBLE 3] Microwave oven does not operate properly with time cooking.



(Fig. 21)

(TROUBLE A) Microwave oven does not operate at all although the START button is pressed. In this case, the oven lamp may go on but not to full brightness and the fan motor may rotate slowly. Also the touch control circuit may not detect the key input signal.

- 1) Check the primary and secondary voltage of the low voltage transformer. The normal voltage of the transformer with no load should read as show in Fig. 21.  
\* When the voltage is outside of the range, replace the low voltage transformer.  
\* When no voltage at the primary side is obtained, refer to (TROUBLE 1) in the trouble shooting guide of the microwave oven circuit on page 31.
- 2) Check the continuity of the door sensing switch. The continuity of door switch should be checked with least one side of the switch open and the power supply cord unplugged. Door sensing switch contacts should open with the door closed.

(TROUBLE B) Oven lamp and fan motor operate normally but microwave does not oscillate or cooking time takes too long when compared to the cooking time described in the cookbook.

- 1) Operate the microwave oven with a water load in the oven and power level at high for a few minutes. Then measure the voltage between the two terminal (terminal 3, 5 of power control relay) of the power control relay with the oven started. Be very cautions of the high voltage. Normal voltage between the two terminals should read 0V AC typical. If the line voltage is applied there, check the continuity of the coil circuit of power control relay (terminal 1, 6 of power control relay). If normal, replace the power relay or touch control circuit.

- 2) If the symptom is that the microwave oven operates normally only at high power setting but does not operate properly at other power settings, measure the timing periods of the line voltage being applied to the two terminal of the relay. The timing periods of the line voltage being applied each power setting should read as listed in Fig. 22. When the timing period of the power control relay is other than those listed above in Fig. 22, replace the touch control circuit or power relay.

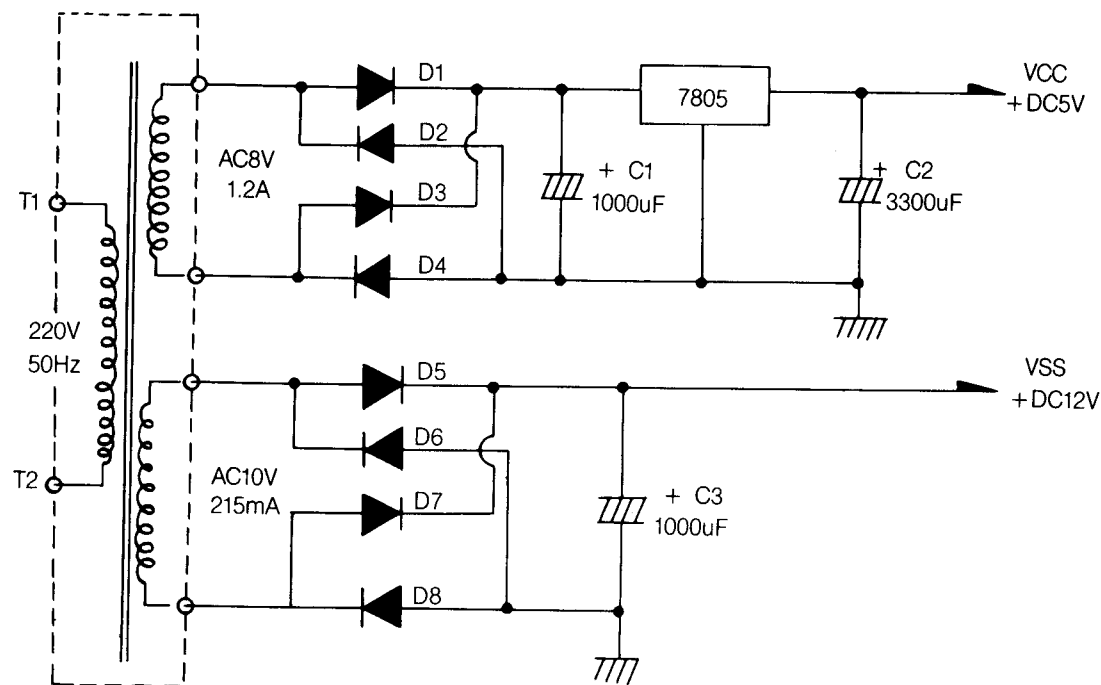
POWER LEVEL	RELAY TURN ON TIME (sec.)	RELAY TURN OFF TIME (sec.)
10	4	26
30	10	20
50	16	14
70	22	8
100	30	0

(Fig. 22) Timing period of power control relay



[TROUBLE 4] Circuit Function

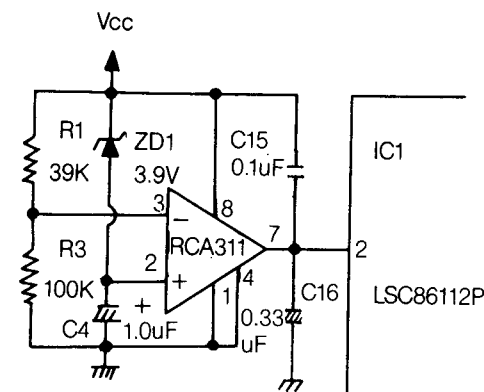
1. Power supply circuits.  
The tolerance is  $\pm 5\%$  for VCC (+5 VDC), VSS (+12 VDC).  
The function of this circuit are as follows:  
(a) To convert AC voltage to DC potentials.  
(b) To regulate the DC potentials suitable for use with other circuits.



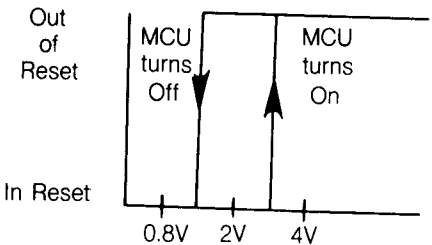
Note 1. Normal voltages are shown.  
2. Each symbol is same as printed on PCB.  
4. D1-D8: Diode IN4001

(Fig. 23) Power Supply Circuit

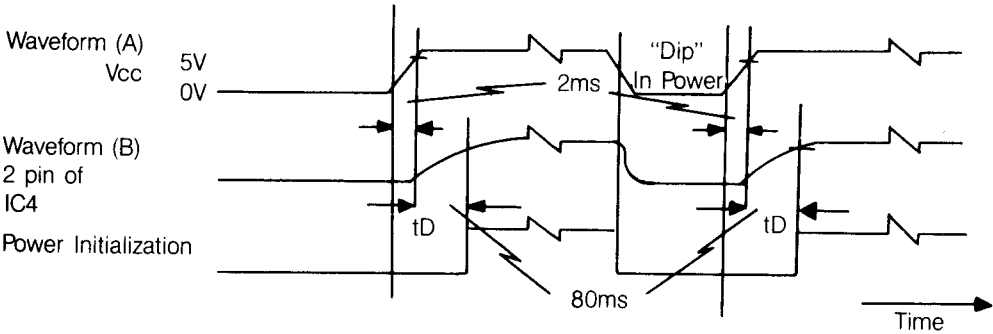
2. Power initializing Circuit (Reset)  
Initializes the microcomputers LSC86112P (IC1) automatically.  
Figure 24 shows the schematic configuration.  
Figure 25 shows the typical reset schmitt trigger thresholds.  
Figure 26 shows the voltage waveforms upon applying power.



(Fig. 24) Power Initializing Circuit  
(Power Up Reset Delay Circuit)



(Fig. 25) Typical Reset Schmitt Trigger  
Thresholds



(Fig. 26) Voltage Waveforms upon Applying Power

### 3. Timer Pulse Shaping Circuit

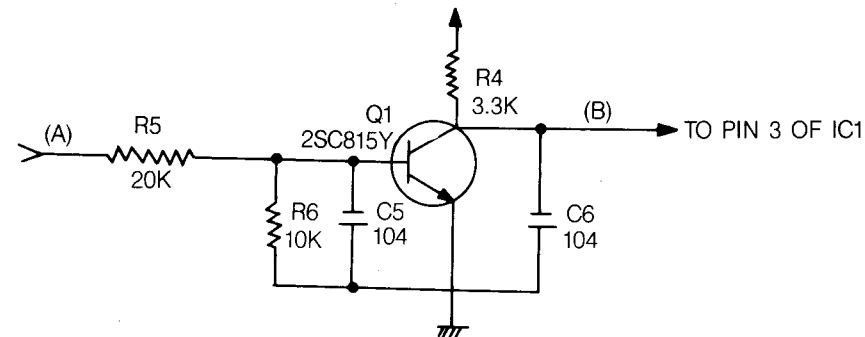
Converts sinusoidal waveform of 50Hz to shaped waveform.

This pulse becomes the time base of timer in the microcomputers

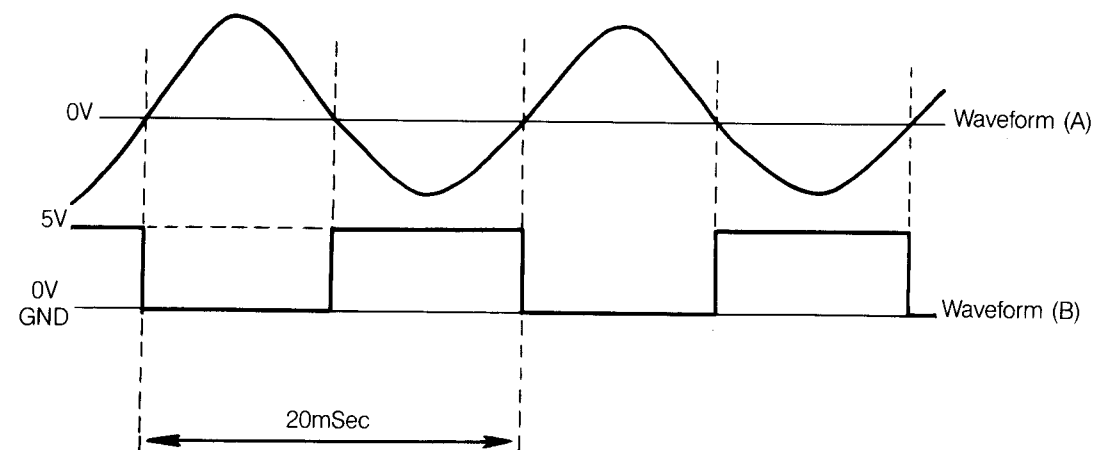
LSC86112P(IC1) and supplies zero-crossing point signal for power control really triggering.

Figure 27 shows the schematic configuration.

Figure 28 shows the waveforms of the each section in figure.



(Fig. 27) pulse shaping circuit

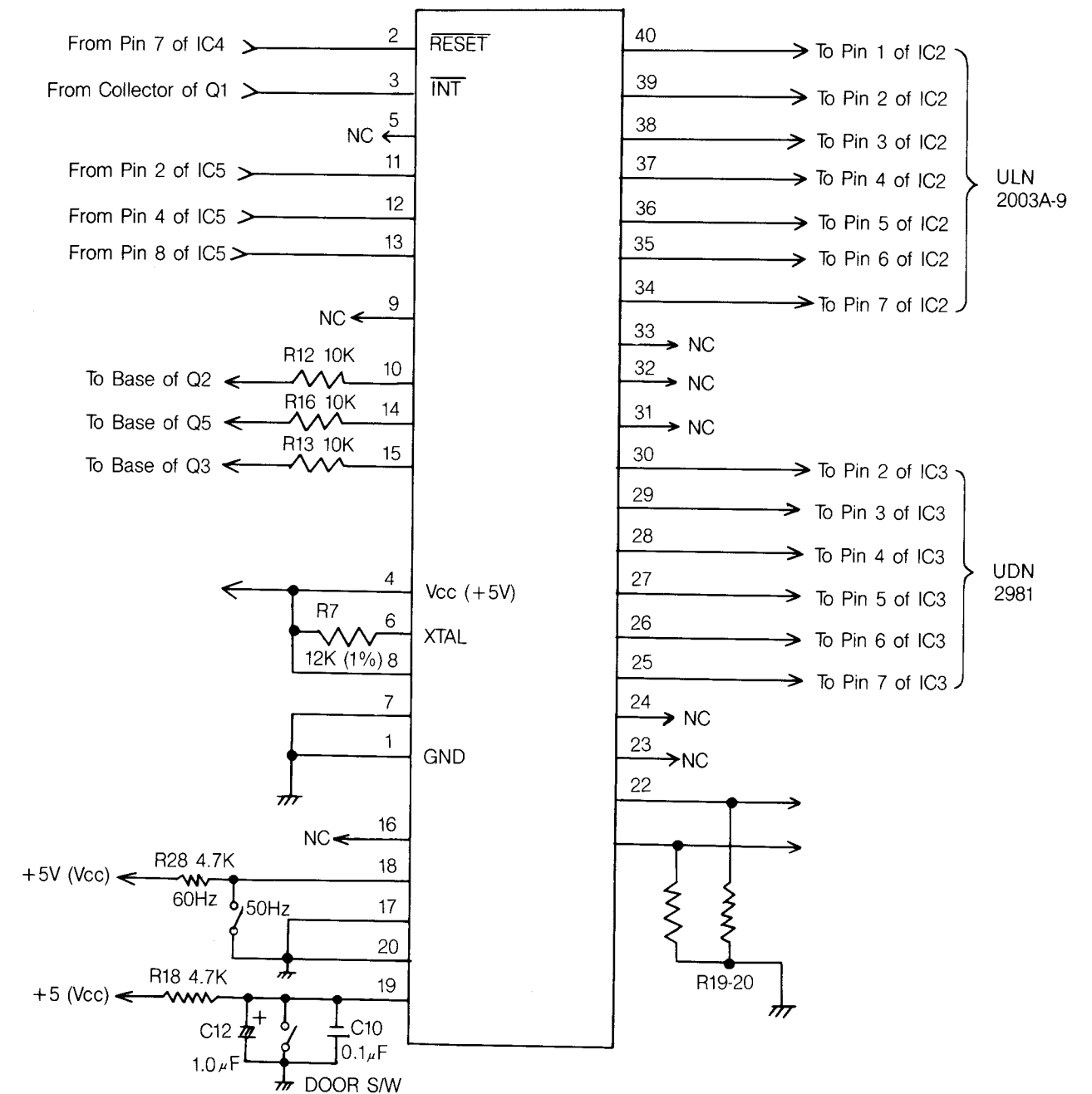


(Fig. 28) Waveform of Each Section in Fig

### 4. Microcomputer LSC 86112P Circuit (IC1)

The functions of this circuit are:

- To receive the information from other circuits including Microcomputer LSC86112P (IC1)
- To store the information.
- To process the information according to the predetermined sequence.
- To send signals to the other circuits including Microcomputer LSC 86112P.

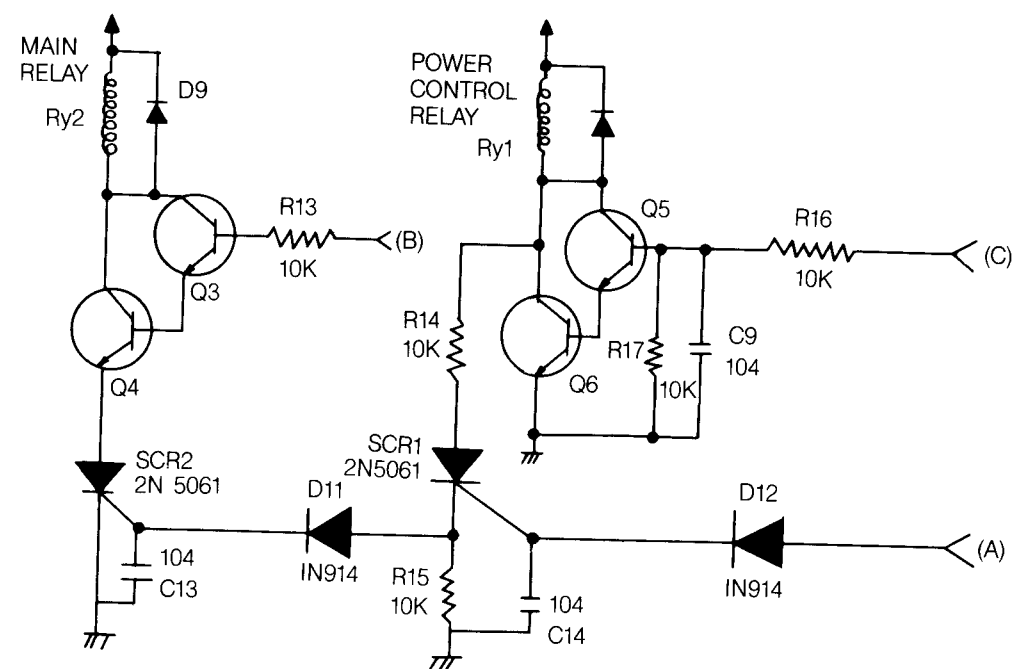


(Fig. 29) Microcomputer LSC86112P (IC1)

Note: R23 instead of jumper wire which is connected from pin 18 of microprocessor to each LSC 86112P Microcomputer to be operated by 60Hz Time Base.

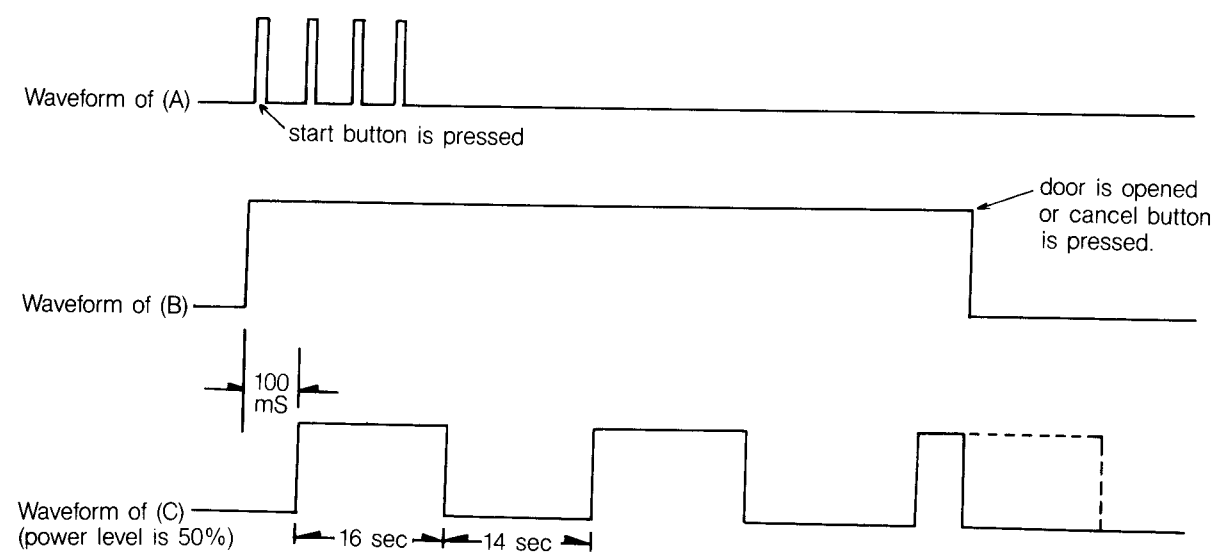
### 5. Power Control Relay and Main Relay driving Circuit

Drives power control relay and main relay according to the signals from the microcomputer IC1. Figure 30 shows the schematic configuration of the driving circuit.



Q3-Q6: NPN TRANSISTOR 2SC815Y

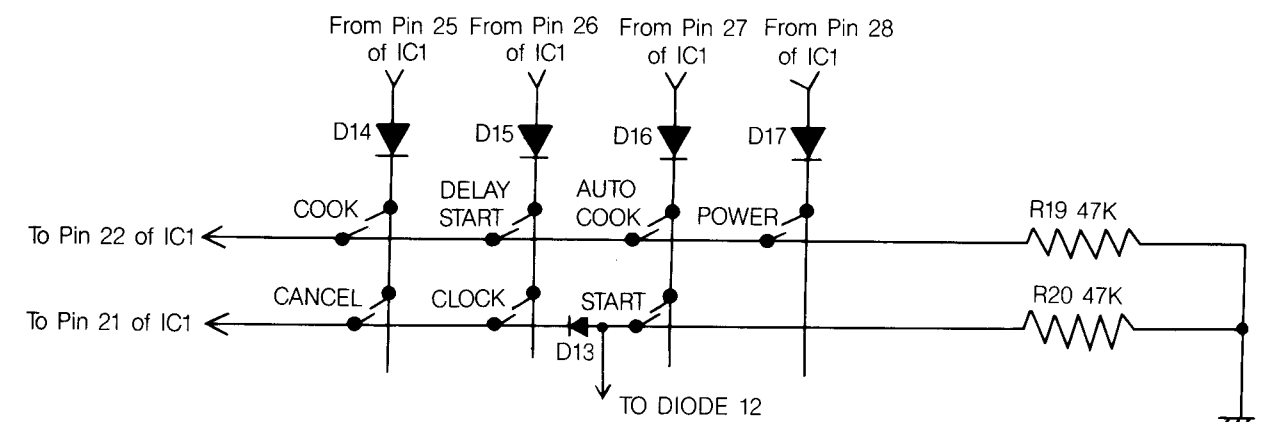
(Fig. 30) Power control and main relay driving circuit



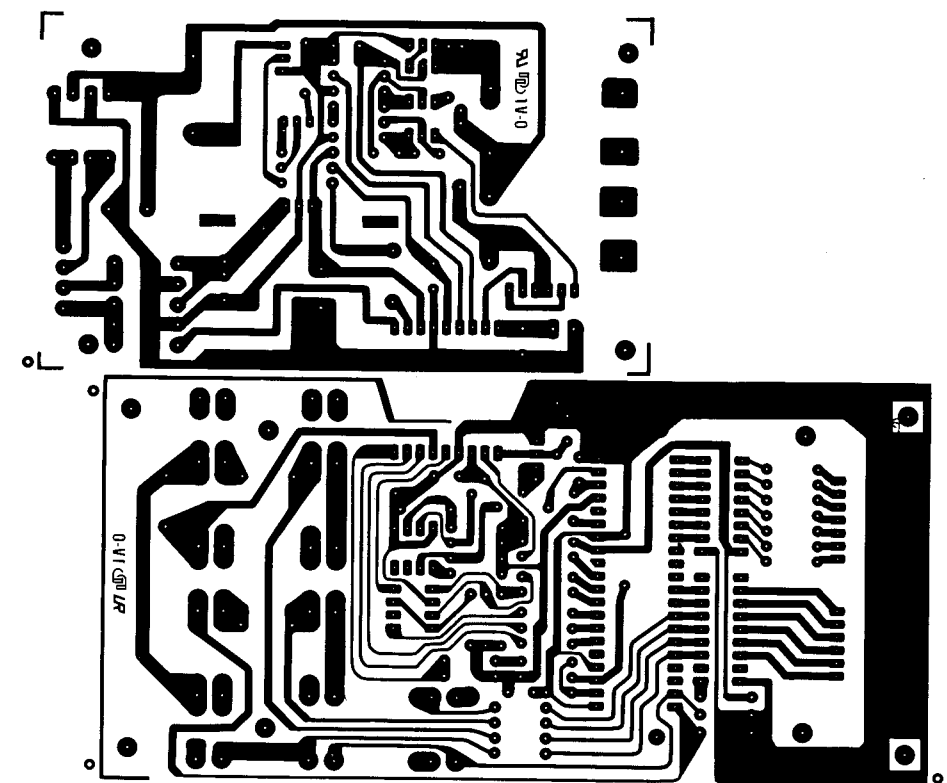
(Fig. 31) Waveform of above circuit

### 6. Function Select Button Matrix (Matrix and PCB Assembly)

This circuit has 7 Keys and its basic wiring is shown in Figure 32. The terminal and Key relationship are shown in figure 32 and 33.



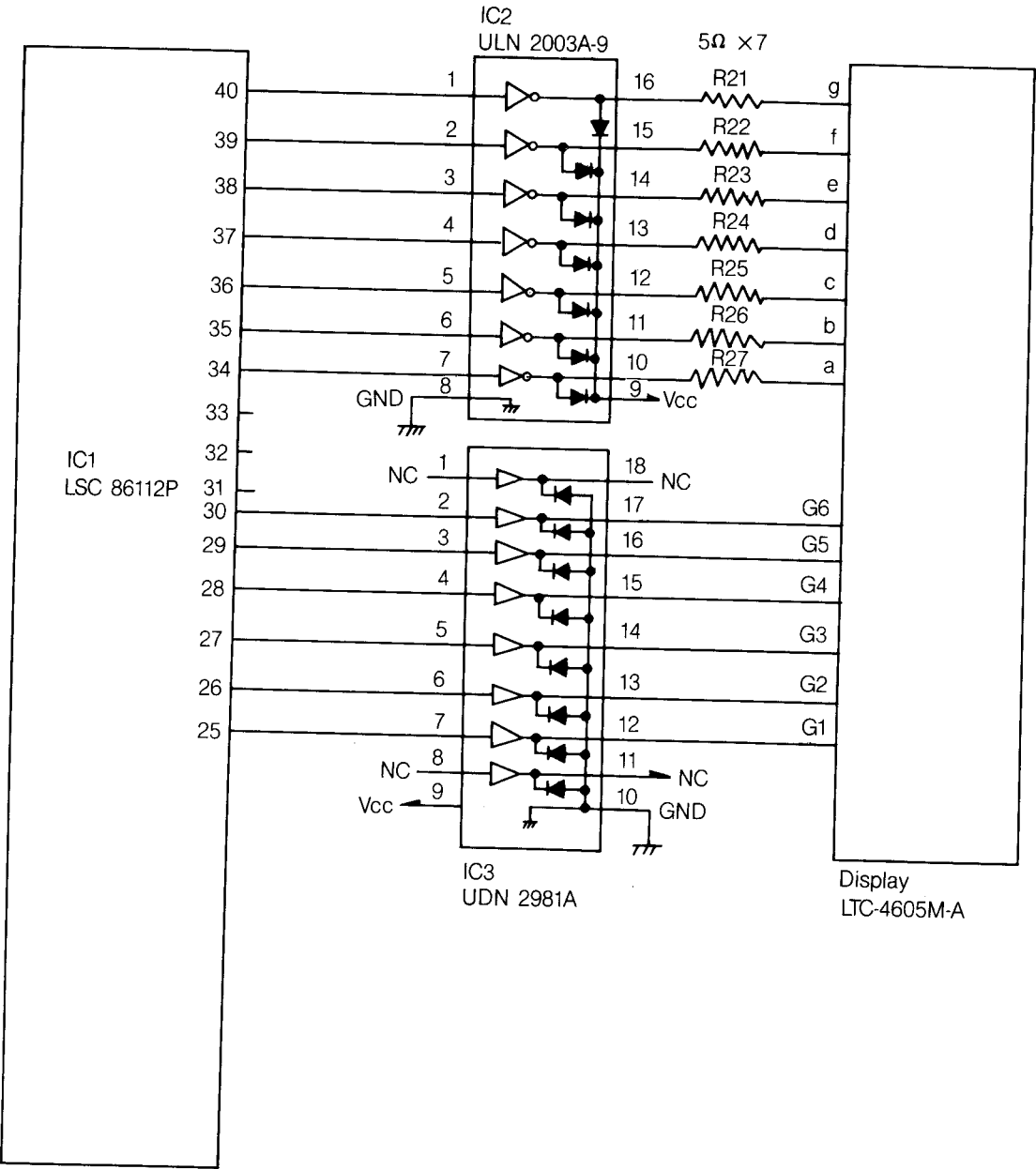
(Fig. 32) Function select button key matrix



(Fig. 33) Printed Circuit Board

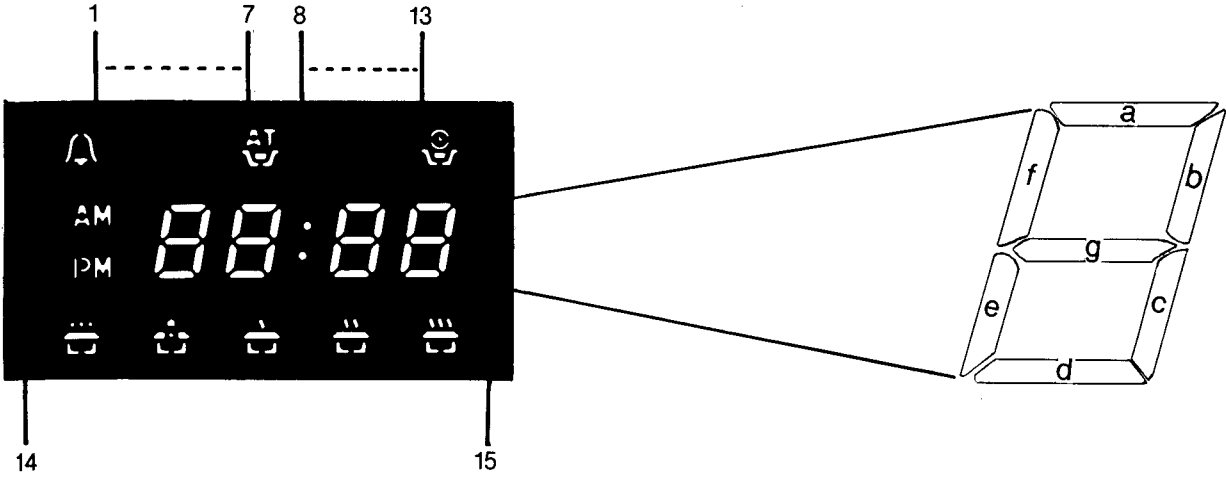
7. Display Circuit

Figure 34 shows the schematic configuration of display circuit.  
Figure 35 shows the pin assignment of LTC-4605M-A display.  
Figure 36 shows the inner circuit of LTC-4605M-A display.



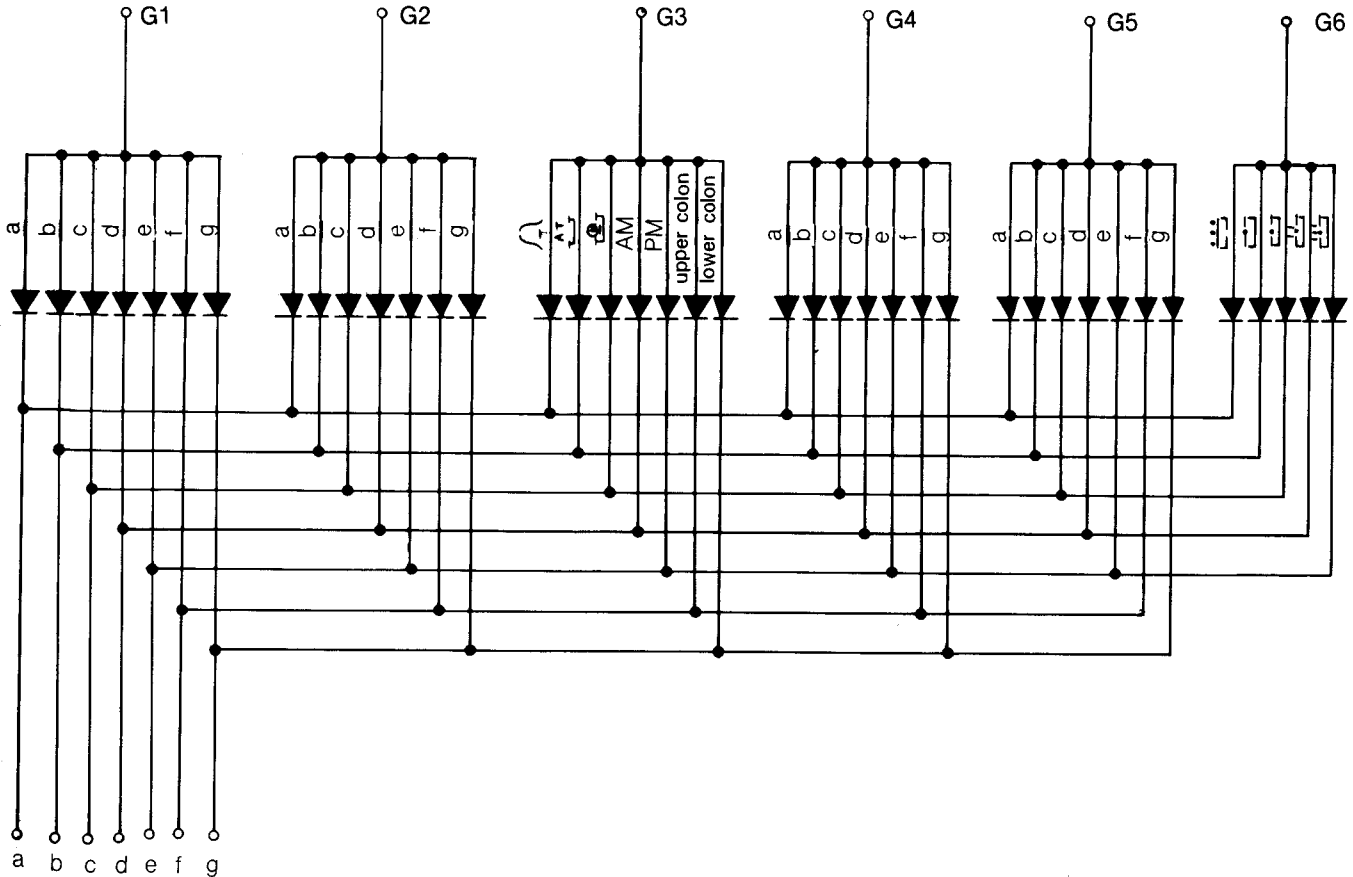
(Fig. 34) Display Circuit

Note: G1-G6: digit signals,  
a-f: segment signals.



Pin No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Connection	g	f	e	d	c	b	a	G6	G5	G4	G3	G2	G1	NC	NC

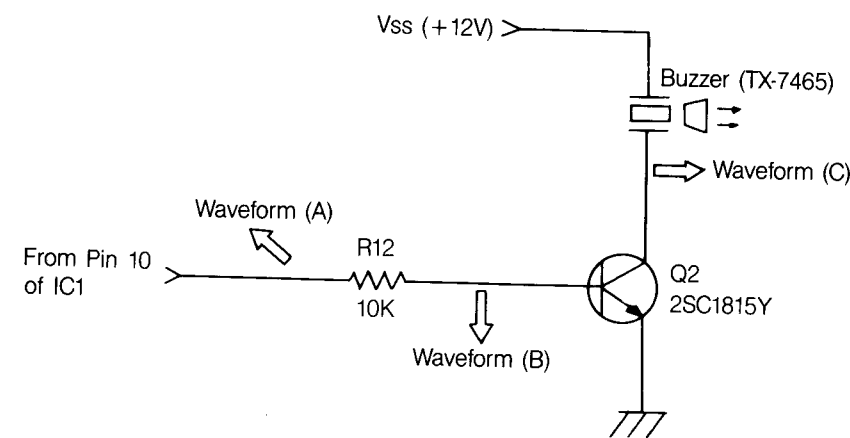
(Fig. 35) Pin Assignment of LTC-4605M-A



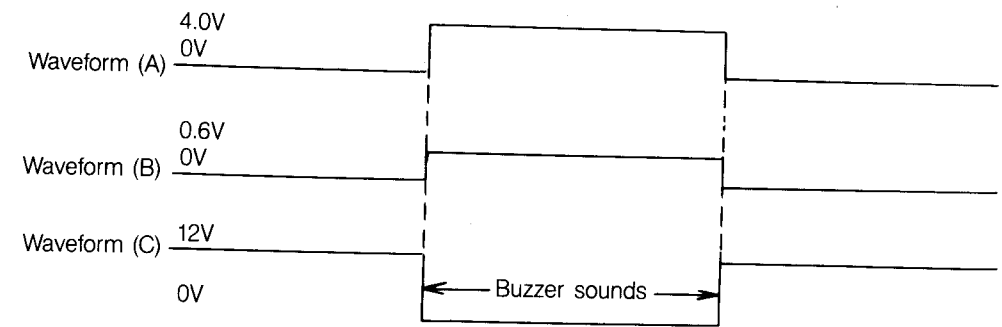
(Fig. 36) Inner Circuit of LTC-4605M-A

8. Buzzer circuit

Buzzer sounds when cooking cycle is completed or when the button input is recognized by the microcomputer LSC86112P (IC1). Figure 37 shows the schematic configuration of buzzer circuit. Figure 38 shows the waveform of each section in figure

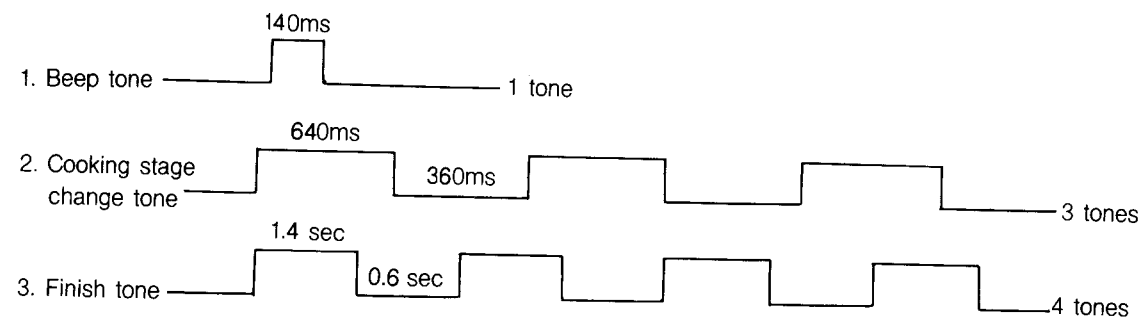


(Fig. 37) Driving Circuit of Buzzer.



(Fig. 38) Waveform of Each Section in Figure 27.

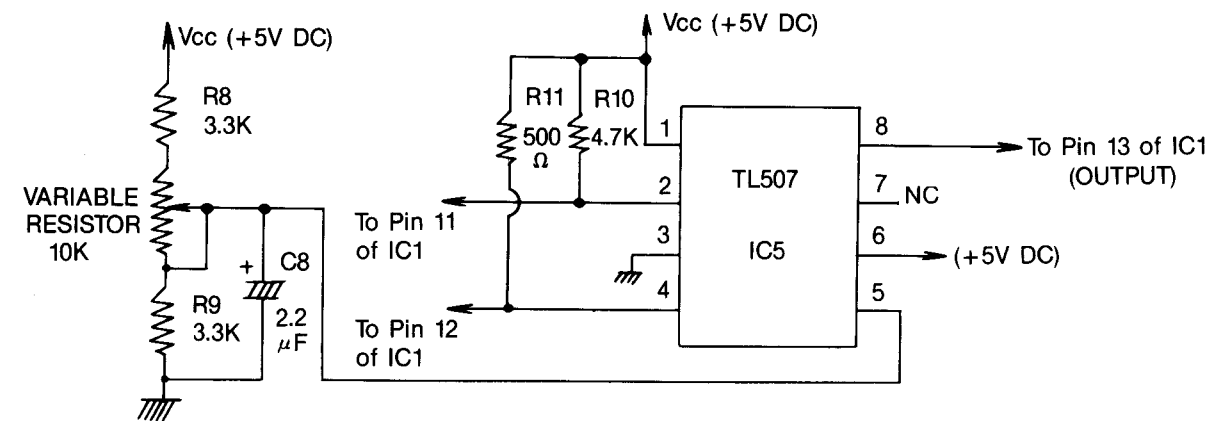
Note: Buzzer Tone Classification



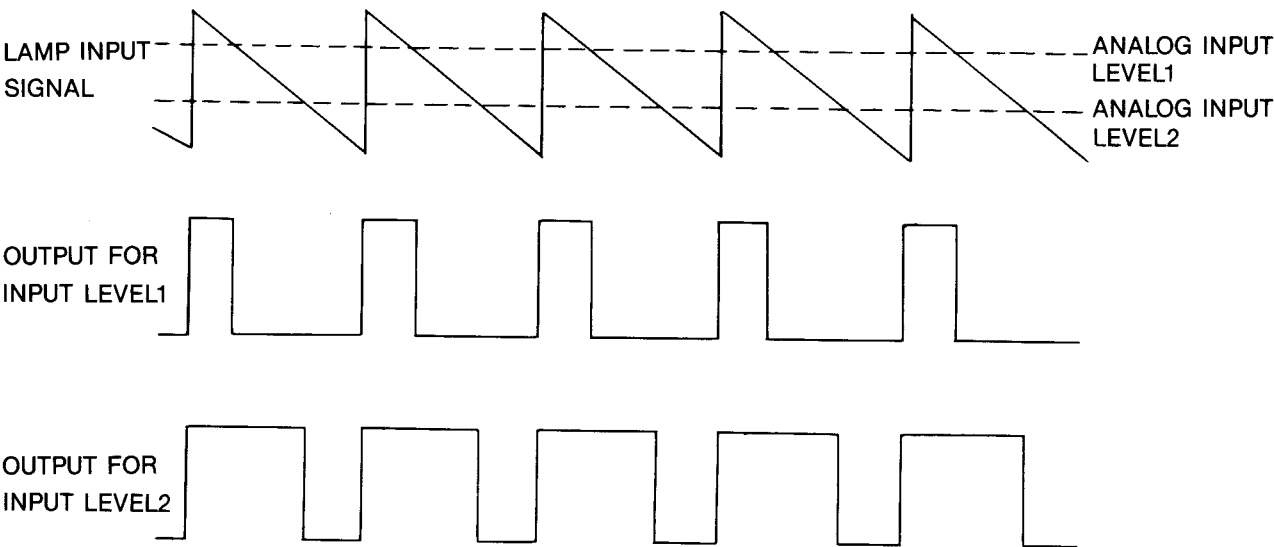
(Fig. 39) Waveform of Each Buzzer Tone

9. Timer Detecting Circuit

Variable potential level apply to A/D converter input pin (pin 5 of IC5). This analog signal is converted to digital signal by A/D converter (TL507).



(Fig. 40) Circuit Description for ANALOG TO DIGITAL CONVERTER



(Fig. 41) Waveform above circuit

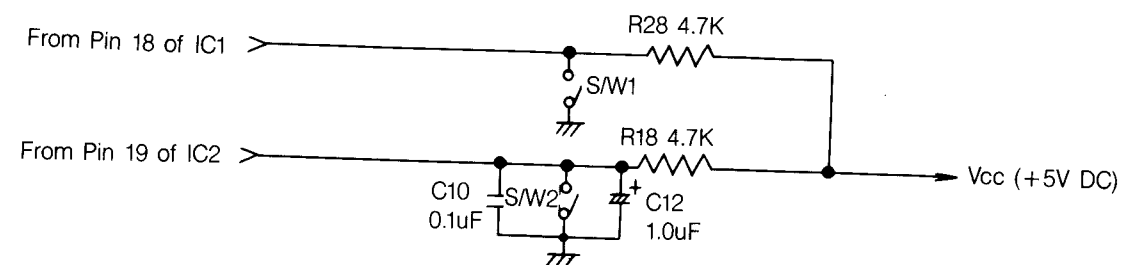
## 10. Status Detecting Circuit

Detects the following and sends the information to microcomputer.

(a) Whether the door is open or closed (S/W2).

(b) Whether the timer pulse frequency for time base is 60 Hz or 50 Hz (S/W1).

Figure 42 shows the schematic configuration of the status detecting circuit.



		ON	OFF
S/W 1	50 Hz/60 Hz	50Hz timer pulse	60Hz time pulse
S/W 2	Door Switch	Door Open	Door Closed

(Fig. 42) Status Detecting Circuit

## 11. SERVICING

### 1) Service Precautions

IC's and LSI are subject to damage from static electricity.

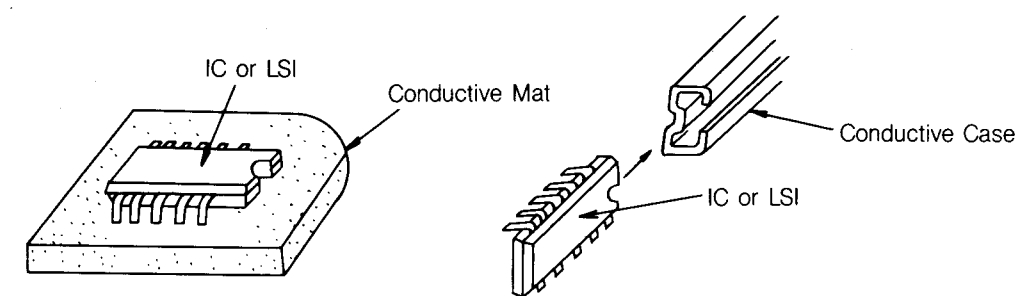
Service with the following precautions:

(a) Stock IC's and LSI in conductive mats or cases.

(b) Handle the parts after earthing working bench, human body, tools etc.

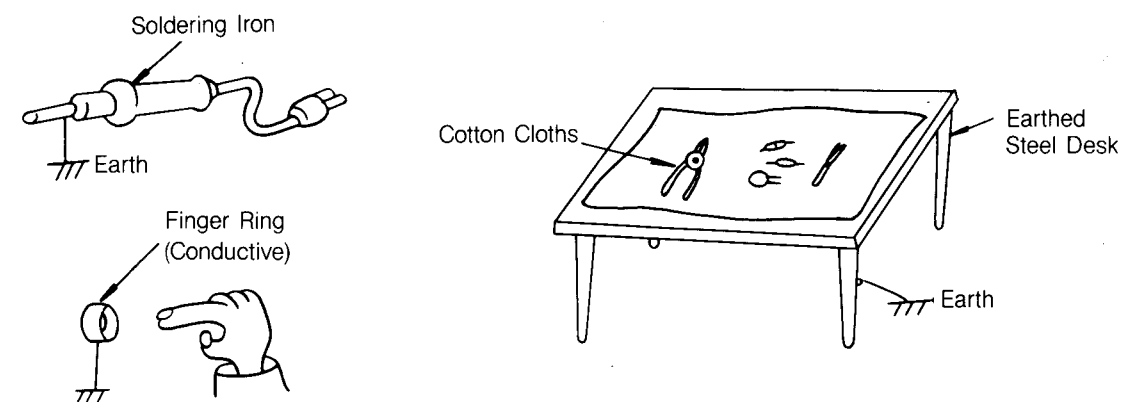
(c) Recommended working mat: Cotton cloths

(d) Recommended working bench: Earthed steel desk (See Below)



Methods of stocking IC's or LSI'

(Fig. 43)



Method of earthing servicing desk

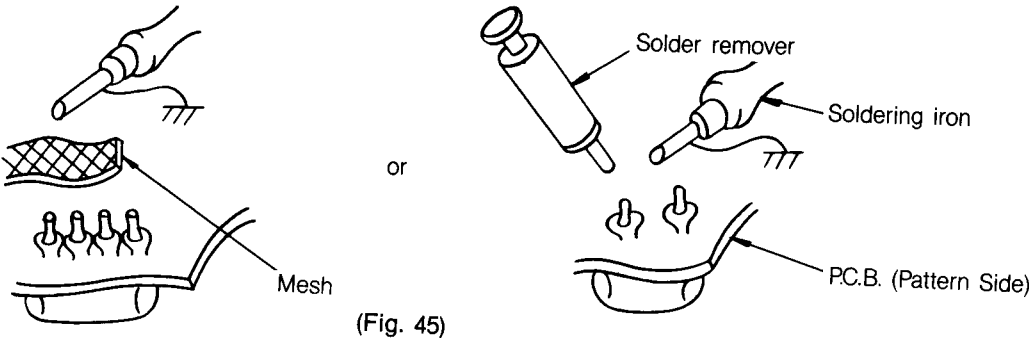
(Fig. 44)



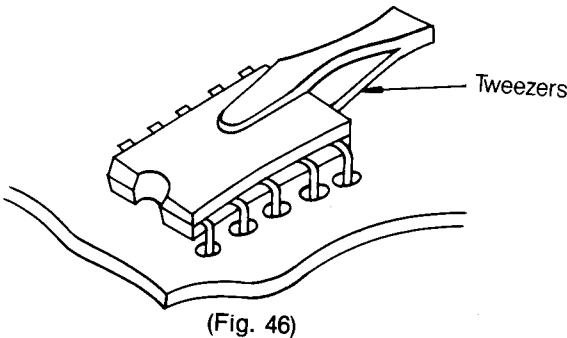
## 2) Desoldering and Soldering of Parts

Tools: (1) Soldering iron (30 watts earthed)  
(2) Desoldering mesh or solder remover  
(3) Tweezers  
(4) Solder with inner flux  
(5) Wire cutting tool

Procedure: (a) Desolder all pins of a defective part using the desoldering mesh.



(b) Remove the desoldered parts from PC.B using Tweezers.



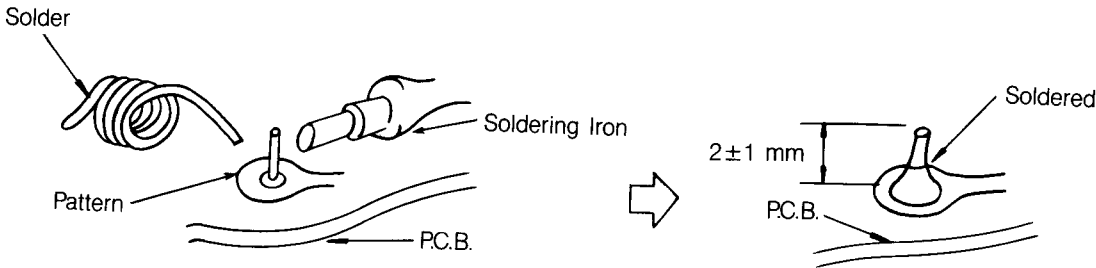
(c) Place a new part into PC.B.

CAUTION: Before inserting new part note the polarity of capacitor, diode and for pin number of IC or LSI.

(d) Warm the pin of parts and pattern on PC.B. using the soldering iron.

CAUTION: This maximum warming time is 1 second.

(e) solder within 5 seconds.



(Fig. 47)

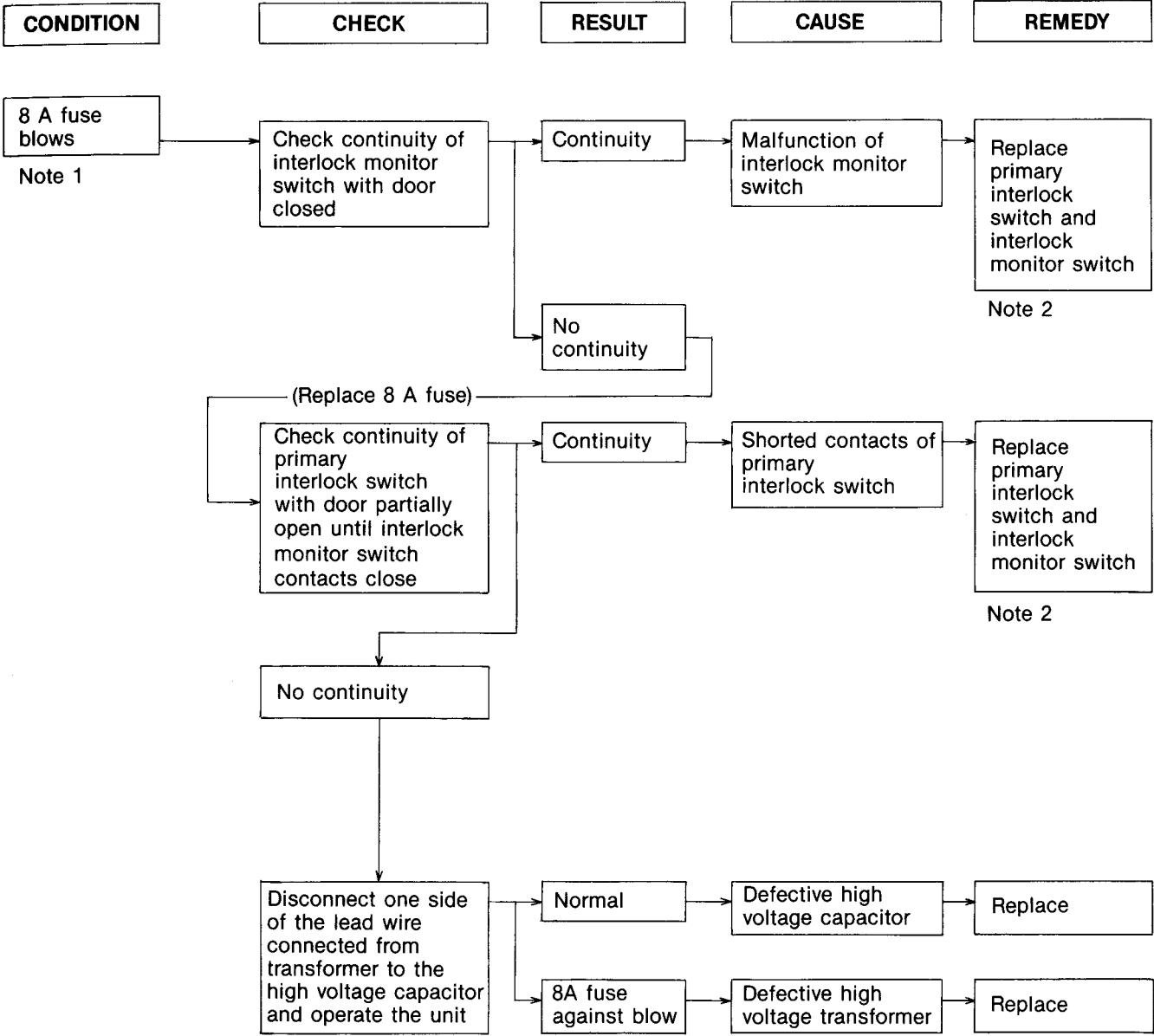
(f) Cut the wire lead as shown in above figure.

CAUTION: Check the soldered portion. If it is poor or solder-bridge, solder again.

## TROUBLESHOOTING GUIDE OF MICROWAVE OVEN CIRCUIT

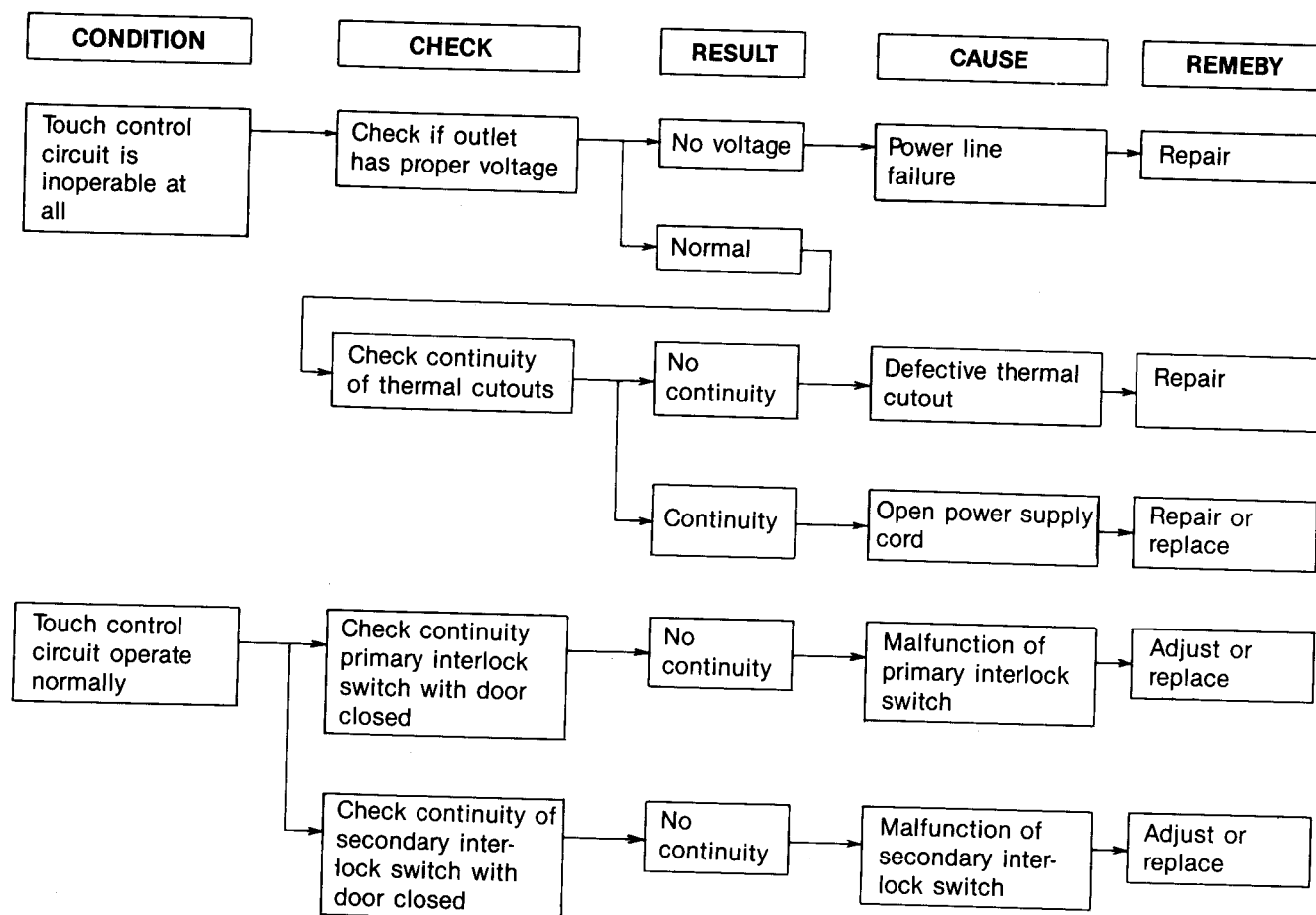
After checking the touch control circuit following the troubleshooting guide on pages 16 or 28, check for trouble by following the procedures below.

[TROUBLE 1] Oven does not operate, namely oven lamp does not light and fan motor does not rotate, even though desired cooking function and time are set and the START button is pressed.

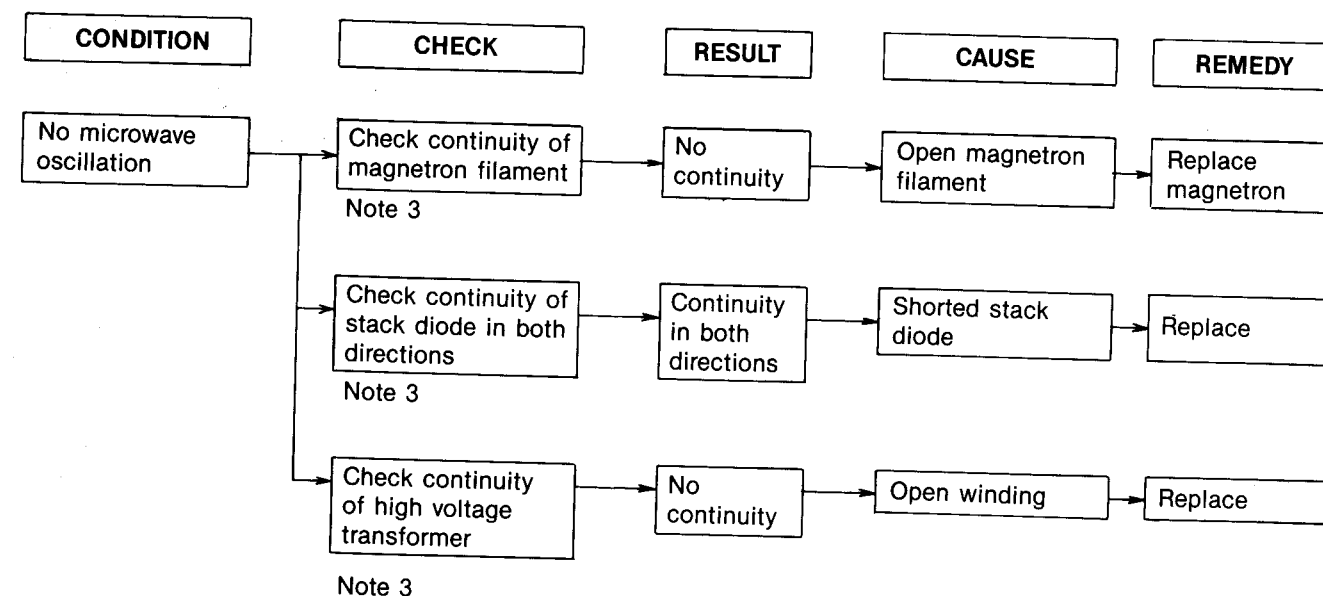


NOTE 1: Before following the particular steps listed in this troubleshooting guide for the 8 Amp fuse's failure, please check for other obvious causes that would contribute to its failure such as shorted fan motor, etc.

NOTE 2: All these switches must be replaced at the same time. Please refer to page 12 for adjustment instructions.

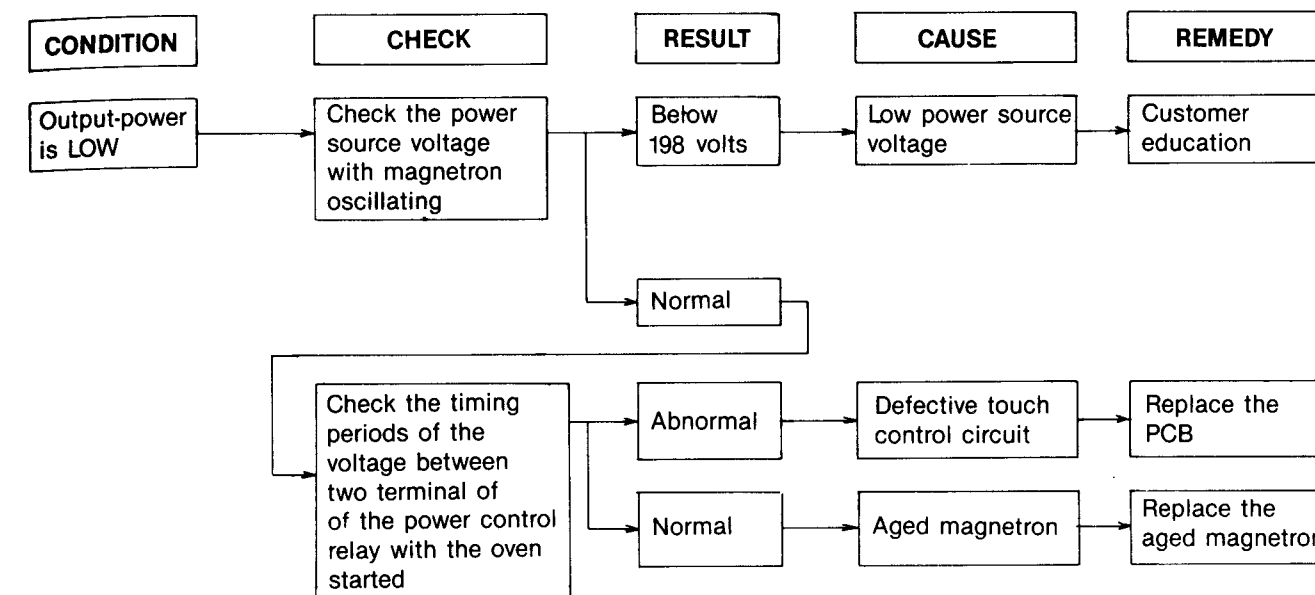


[TROUBLE 2] Oven does not cook even though oven lamp lights and fan motor rotates.



NOTE 3: Take measurement without operating.

[TROUBLE 3] Output power is low



NOTE 4

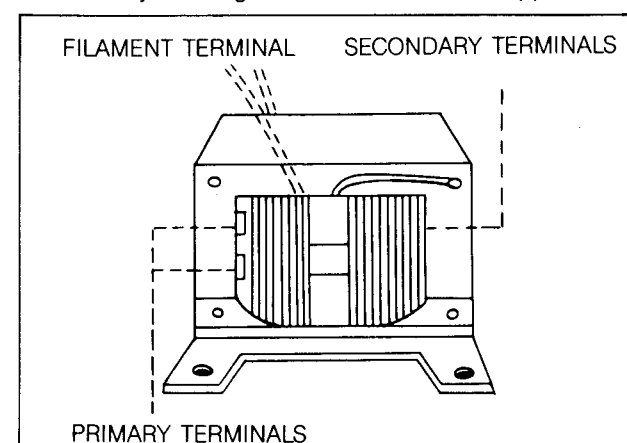
NOTE 4: Refer to the power control relay check procedure on page 17.

## COMPONENT TEST PROCEDURE

1. High voltage is present at the high voltage terminal of the high voltage transformer during any cook cycle.
2. It is neither necessary nor advisable to attempt measurement of the high voltage.
3. Before touching any oven components, or wiring, always unplug the oven from its power source and discharge the capacitor (See page 6).

### 1. High voltage transformer

- (A) Remove connections from the transformer terminals and check continuity.
- (B) Normal readings should be as follows.  
Secondary winding ..... Approx. 85—95  $\Omega$   
Primary winding ..... Approx. 1.5  $\Omega$



(Fig. 48)

### 3. High voltage capacitor

- (A) Check continuity of capacitor with meter on highest

OHM scale.

- (B) A normal capacitor will show continuity for a short time, and then indicate 9M $\Omega$  once the capacitor is charged.
- (C) A shorted capacitor will show continuous continuity.
- (D) An open capacitor will show constant 9M $\Omega$ .
- (E) Resistance between each terminal and chassis should be infinite.

### 3. Diode

The diode is located on the bracket fan motor.

- (A) Isolate the diode from the circuit by disconnecting the leads.
- (B) With the ohmmeter set on the highest resistance scale, measure the resistance across the diode terminals. Reverse the meter leads and again observe the resistance reading. Meter with 6V, 9V or higher voltage batteries should be used to check the front-to-back resistance of the diode, otherwise an infinite resistance may be read in both directions.

A normal diode's resistance will be infinite in one direction and several hundred K $\Omega$  in the other direction.

#### 4. Magnetron

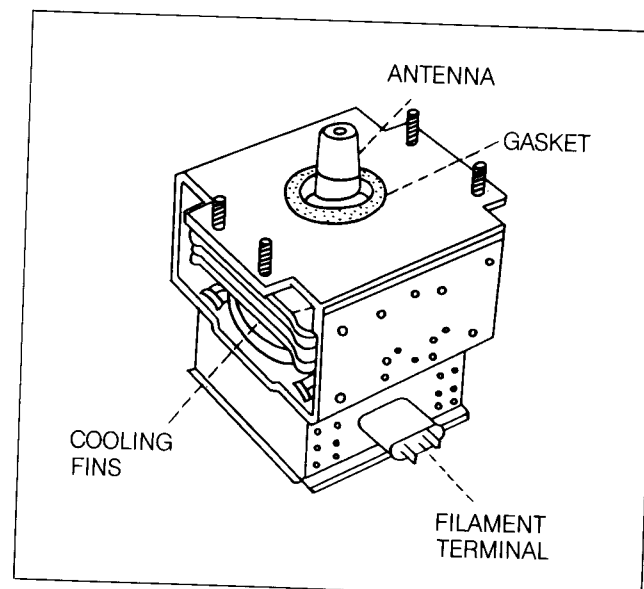
For complete magnetron diagnosis, refer to "Measurement of the Magnetron's output" (page 13). Continuity checks can only indicate an open filament or a shorted magnetron. To diagnose for an open filament or shorted magnetron;

- (A) Isolate magnetron from the circuit by disconnecting the leads.
- (B) A continuity check across magnetron filament terminals should indicate one ohm or less.
- (C) A continuity check between each filament terminal and magnetron case should read open.

#### 5. Low voltage transformer

The low voltage transformer is located on the base plate.

- (A) Remove lead wire connectors of the low voltage transformer from lead wire harness and check continuity.
- (B) Normal reading of primary winding is about 300 ohm.



(Fig. 49)

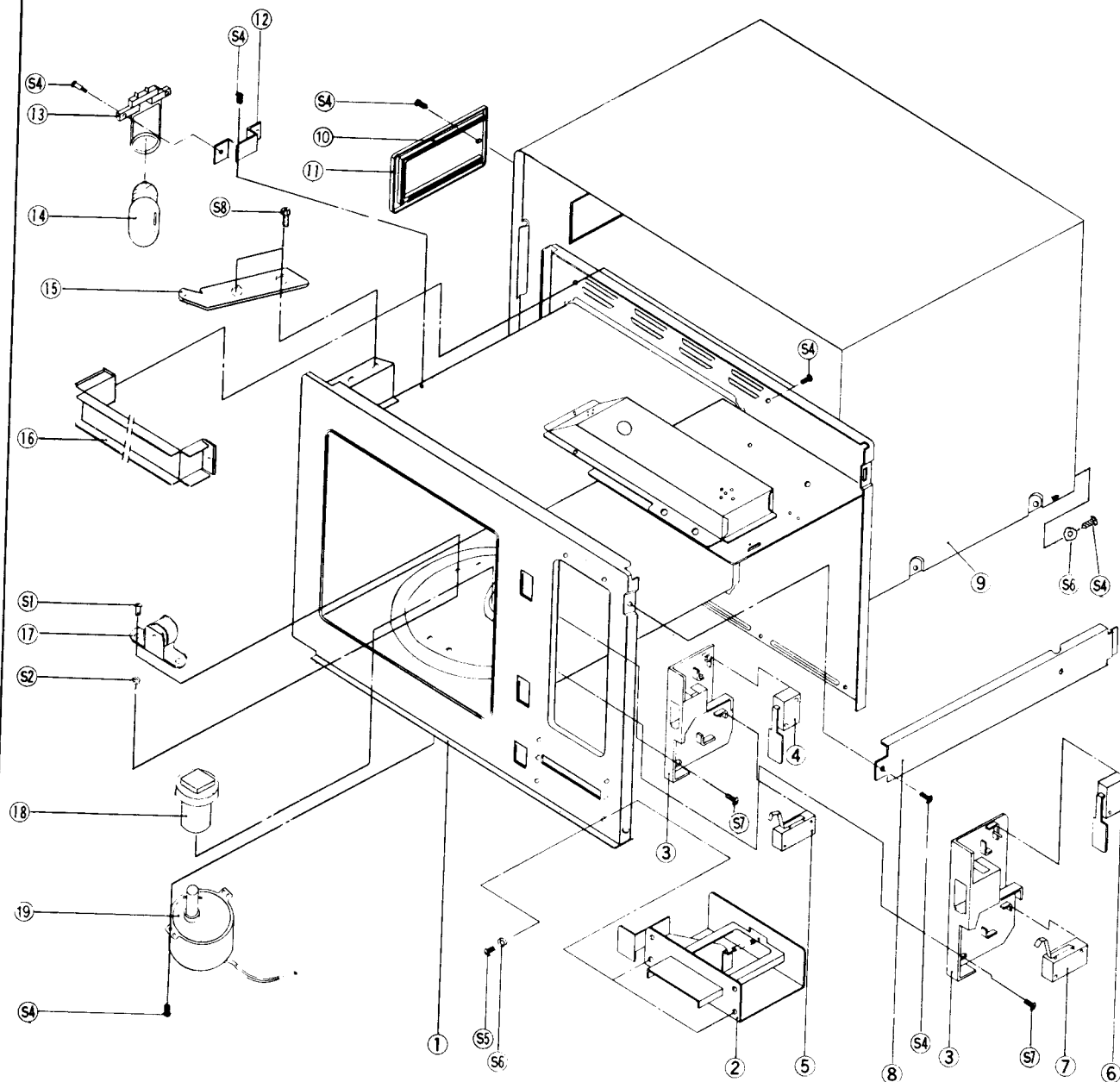
## TOUCH CONTROL CIRCUIT TEST PROCEDURE

AFTER REPLACING THE TOUCH CONTROL CIRCUIT, MAKE THE TOUCH CONTROL TEST ACCORDING TO THE FOLLOWING PROCEDURES TO MAKE SURE THAT THE TOUCH CONTROL CIRCUIT AND THE MICRO-WAVE OVEN CIRCUIT ARE OPERATIVE.

1. Connect the power supply cord plug into the wall receptacle and place a water load in the oven.
2. Check if the Display Window shows "PF". If the display window does not show "PF", unplug the power cord, wait 10 seconds, and plug in the power cord again.
3. Key in the correct time of day by pressing the clock button and turning the timer so that the time of day can be registered into the touch control circuit.
4. Press the TIME COOK button and then turn the timer knob. The COOK indicator light turns on and proper setting time appears in the display window.
5. Touch the START button. Timer counts down by seconds. Fan motor, turn table motor and oven lamp turn on and magnetron start oscillation. Press the DOOR OPEN button. Timer stops counting down, fan motor and turntable motor stop functioning. Magnetron stops oscillation.
6. Touch the START button again. Timer resumes counting down and the microwave oven resumes all functions.
7. Touch the CANCEL button. Microwave oven stops all cooking functions but the remaining cooking data are still registered in the touch control circuit.
8. Touch CANCEL button again. The remaining cooking data is cleared, and the time of day reappears in the display window.
9. Remove the hot water load from the oven, and replace with cold water. Reprogram the cooking time.
10. Touch START button. Fan motor, turn table motor and oven lamp turn on. Magnetron starts oscillation.
11. After cooking is completed, the buzzer sounds 4 beep tones. The cook indicator light turns off. The time of day reappears in the display window. Fan motor, turn table motor and oven lamp turn off and magnetron stops oscillation.
12. Finally make sure that the time of day in the display is correct.

# EXPLODED VIEW AND PART LIST

## CAVITY PARTS



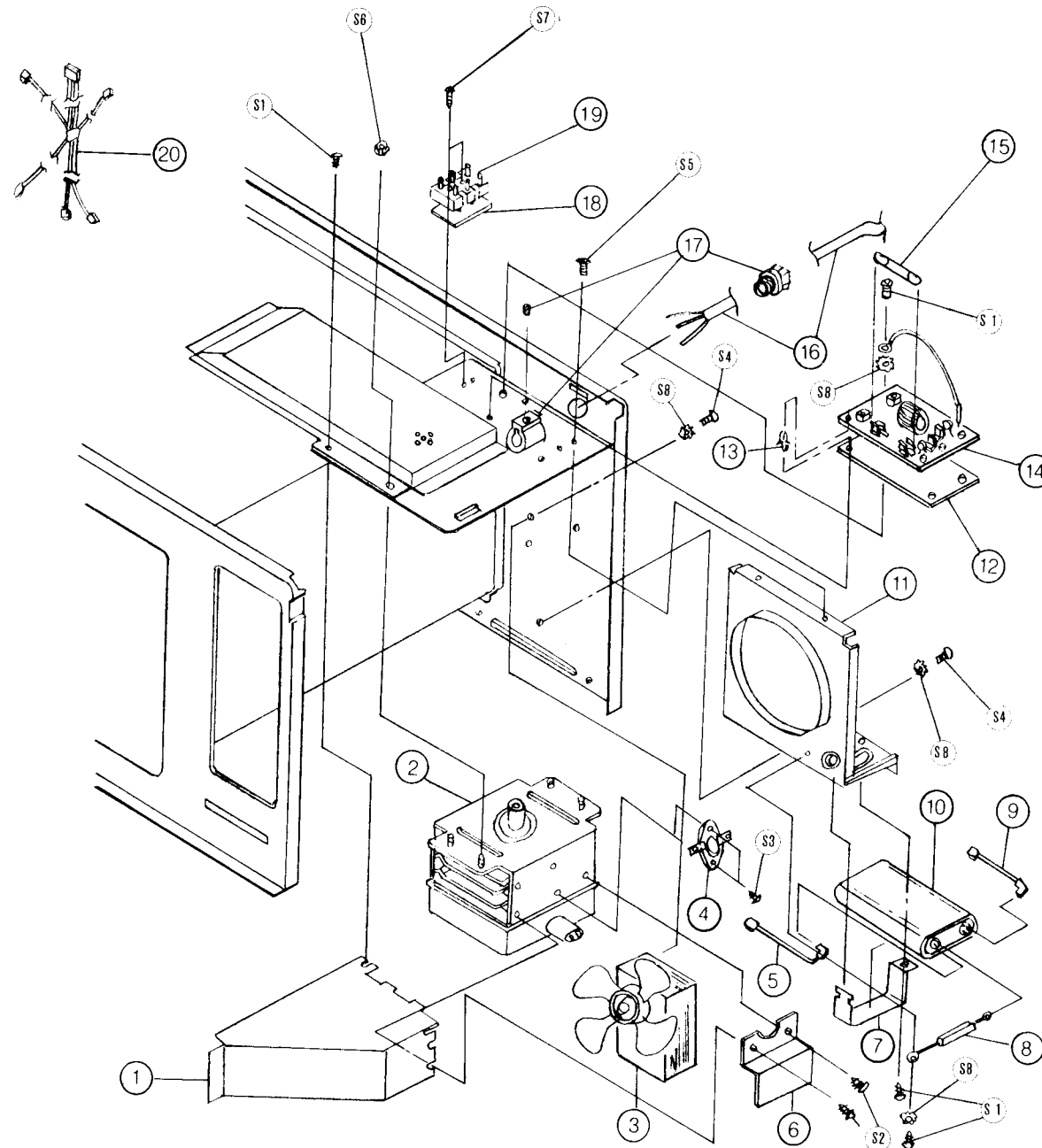
## PARTS LIST (CAVITY PARTS)

Ref. No.	Supplier Part No.	Description	Specification	Pcs/Set	Remarks
1	9291-206-613	ASS'Y-CAVITY	RE-630	1	
2	9293-207-010	ASS'Y-BUTTON LATCH "T"	RE-630	1	
3	6463-212-610	BODY-LATCH S/W	RE-630	2	
4	3579-203-155	MONITOR S/W	V-5132D-079	1	
5	3579-203-163	DOOR-SENSING S/W	V-5526D-040	1	
6	3579-203-162	SECONDARY S/W	V-5113D-086	1	
7	3579-203-154	PRIMARY S/W	V-5136D-078	1	
8	6653-209-310	SUPPORT-M.G.T	RE-630	1	
9	6401-215-630	PANEL-OUTER	ELLIO SHEET WHT	1	RE-630ME (SSW)
9	6401-215-610	PANEL-OUTER	ELLIO SHEET I/BRN	1	RE-630ME (SSI)
10	6803-206-560	CUSHION	SPONGE	1	
11	6153-207-922	COVER-OVEN LAMP	ELLIO SHEET WHT	1	RE-630ME (SSW)
11	6153-207-920	COVER-OVEN LAMP	ELLIO SHEET I/BRN	1	RE-630ME (SSI)
12	6614-260-110	BKT-LAMP	SBHG1-A	1	
13	6609-200-224	SOCKET-LAMP	BS770	1	
14	2059-301-039	LAMP	220V, 20W E/14	1	
15	9294-204-310	HINGE-UPPER	DACRO TIZED	1	
16	6403-256-210	GUIDE-AIR	SBHG1-M	1	
17	5224-203-310	ASS'Y ROLLER	RE-630	3	
18	5143-200-810	COUPLER	RE-630	1	
19	4769-221-529	DRIVE-MOTOR	GM-6-24L	1	

## STANDARD PARTS

Ref. No.	Supplier Part No.	Description	Specification	Pcs/Set	Remark
S1	7028-140-086	SCREW-PH	+ M4×8 STS304	6	
S2	7224-209-610	NUT-FLANGE	MSWR10 M4	6	
S3	7154-201-410	SCREW-SPECIAL	MSWR3	1	
S4	7128-240-101	SCREW-TAP, TH	2-4×10 FE, FZY	18	
S5	7108-540-102	SCREW-TAP, PH	+ 2S-4×10 FE, ZPC3	4	
S6	7328-204-001	WASHER-TOOTHED	B-4PI FE, FZY	4	
S7	7154-202-410	WASHER-SCREW	MSWR10 4×10	4	
S8	7094-211-410	FLANGE-BOLT	MSWR3 M5×10 FE, FZY	2	

# MAGNETRON PARTS



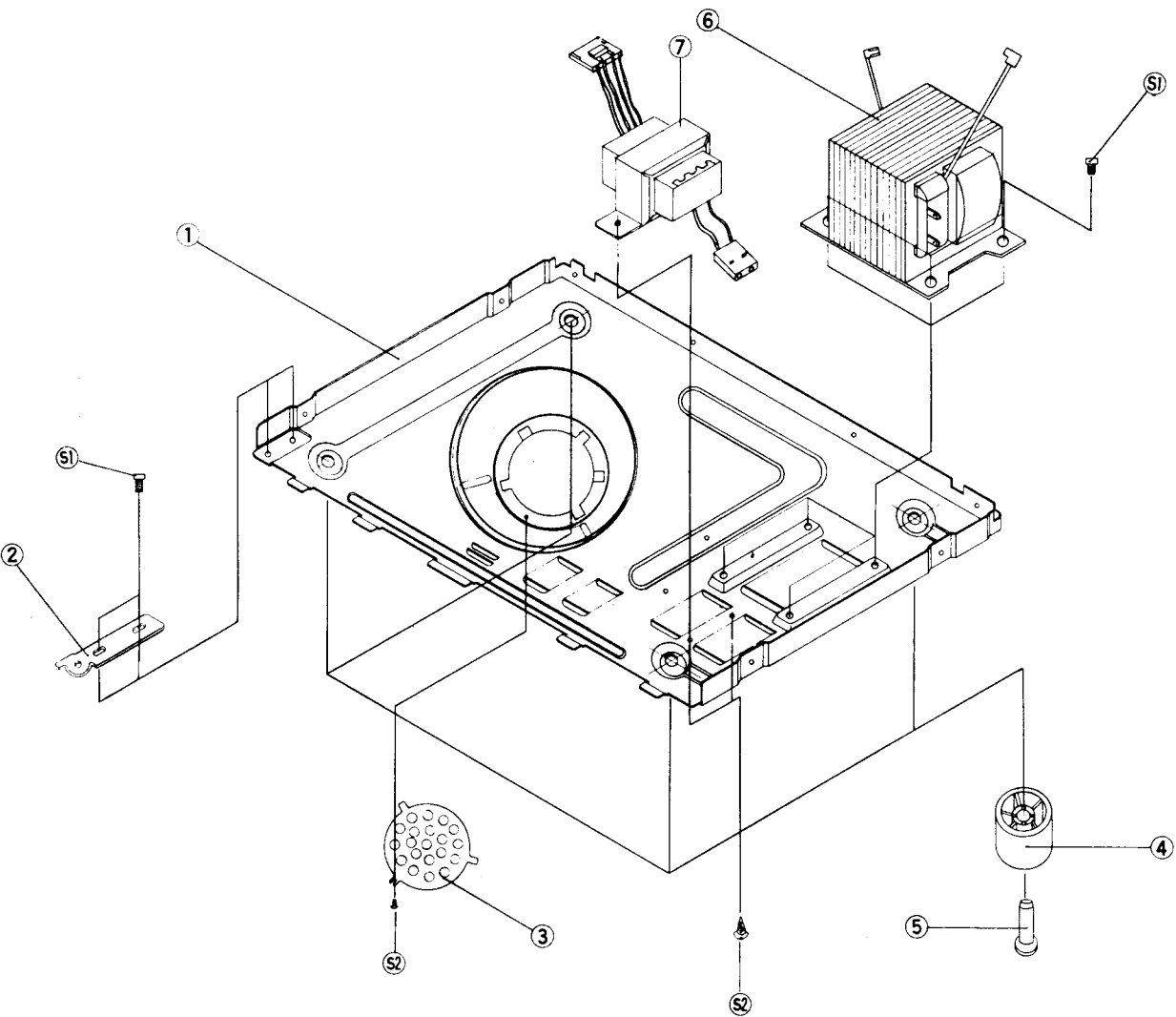
## PARTS LIST (MAGNETRON PARTS)

Ref. No.	Supplier Part No.	Description	Specification	Pcs/Set	Remarks
1	6152-204-410	COVER-AIR	SBHG1-A T0.5	1	
2	2039-001-132	MAGNETRON	2M167B-M10 (SP)	1	
3	4769-221-527	FAN-MOTOR	RT-0450TE; 220V 50Hz	1	
4	3589-001-030	THERMO-SWITCH	CS-7SA	1	
5	3054-221-710	LEAD-WIRE 630-A		1	
6	3903-200-110	PAPER-INSULATION	MYLAR DACRON T0.3	1	
7	6614-259-320	BKT-H.V.C	SBHG1-A T0.6 (S)	1	
8	2169-219-108	H.V. DIODE	HVR-1X-32B	1	
9	3054-221-720	LEAD-WIRE 630-B		1	
10	1569-902-053	H.V. CAPACITOR	SCH-212914A1	1	
11	6153-208-110	COVER-MOTOR	SBHG1-A T0.8	1	
12	3934-210-710	PAPER-P.C.B	MYLAR DACRON T0.3	1	
13	6659-200-517	P.C.B-SUPPORT	DASS-L6N	4	
14	9199-202-910	ASS'Y-CHOKE P.C.B.		1	
15	4709-102-219	FUSE-TIME DELAY	MDA 8A 250V	1	
16	3059-861-239	AC POWER-CORD	LP-34A	1	
17	6639-202-310	BUSHING-CORD	IC-001	1	
18	3904-201-710	PAPER-INS, TB	MYLAR DACRON T0.3	1	
19	3349-201-710	TERMINAL-BLOCK	500-33/DS 3-POLIG	1	
20	9192-241-010	WIRE HARNESS	RE-630ME	1	

## STANDARD PARTS

Ref. No.	Supplier Part No.	Description	Specification	Pcs/Set	Remarks
S1	7128-240-101	SCREW-TAP, TH	2-4x10 FE, FZY	4	
S2	7128-240-061	SCREW-TAP, TH	2-4x6 FE, FZY	2	
S3	7108-530-061	SCREW-TAP, PH	2S-3x6 FE, FZY	2	
S4	7008-140-081	SCREW-PH	+M4x8 MSWR10 ZPC3	4	
S5	7154-202-410	WASHER-SCREW	MSWR3 4x10	2	
S6	7224-209-210	NUT-FLANGE	MSWR10 M5XP0.8 FE, FZY	4	
S7	7108-530-161	SCREW-TAP, PH	2S-3x16 FE, FZY	2	
S8	7328-204-001	WASHER-TOOTHED	B-4PI FE, FZY	5	

BASE PLATE PARTS



PARTS LIST (BASE PLATE PARTS)

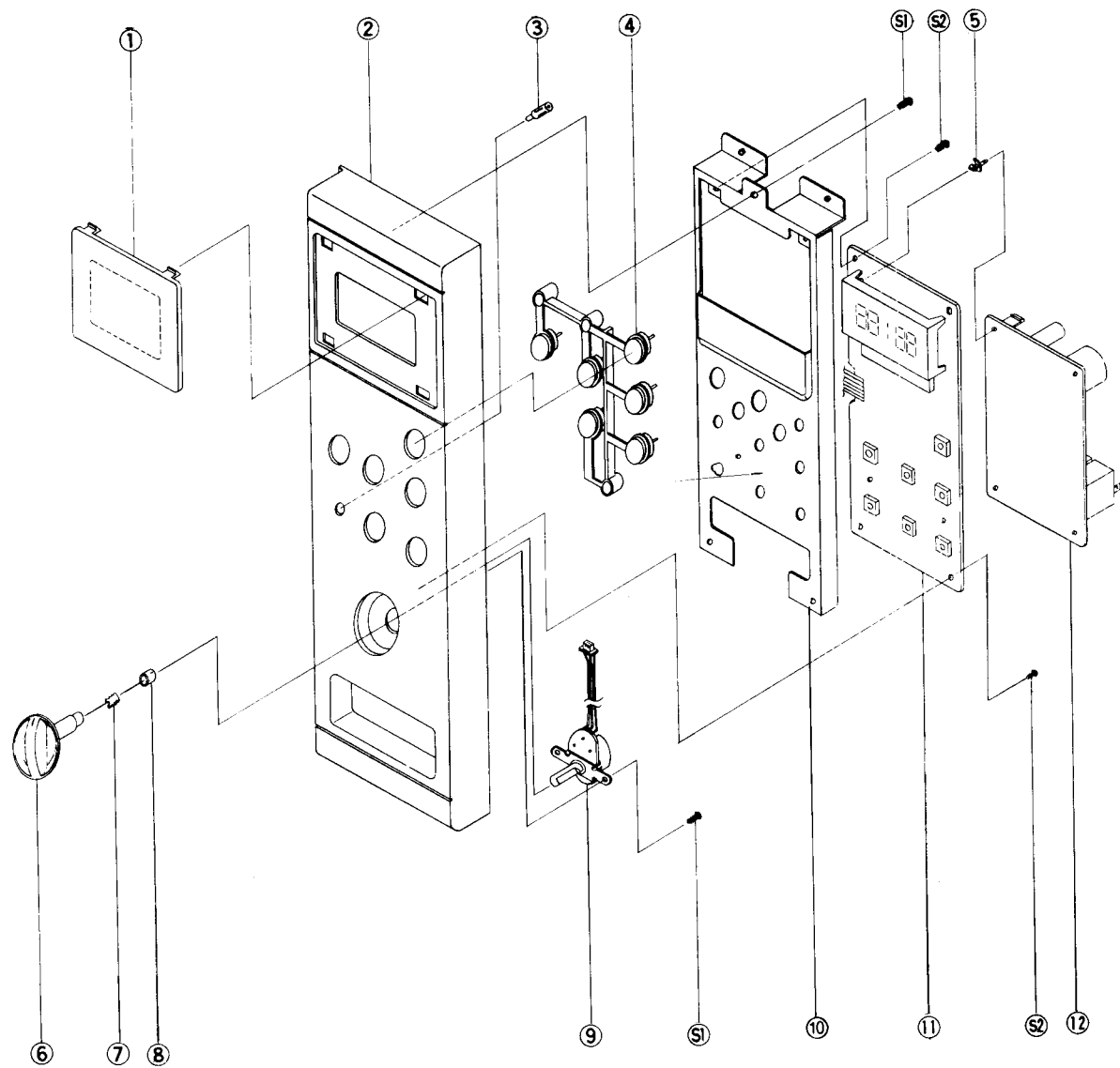
Ref. No.	Supplier Part No.	Description	Specification	Pcs/Set	Remarks
1	9292-205-610	ASS'Y-PLATE BASE	RE-630	1	
2	6614-260-010	HINGE-LOWER	DACRO TIZED	1	
3	6153-208-410	COVER-DRIVER	SBHG1-M	1	
4	6073-200-210	FOOT	P.P	4	
5	7364-206-610	PIN-FOOT	P.P	4	
6	2869-203-549	H.V. TRANS	Y630STC 220V 50Hz	1	
7	9194-209-720	L.V. TRANS	RE-630ME 220V 50Hz	1	

STANDARD PARTS

Ref. No.	Supplier Part No.	Description	Specification	Pcs/Set	Remarks
S1	7094-211-410	FLANGE-BOLT	MSWR3 M5 x 10 FE, FZY	6	
S2	7128-240-101	SCREW-TAP, TH	2-4 x 10 FE, FZY	3	



CONTROL PARTS



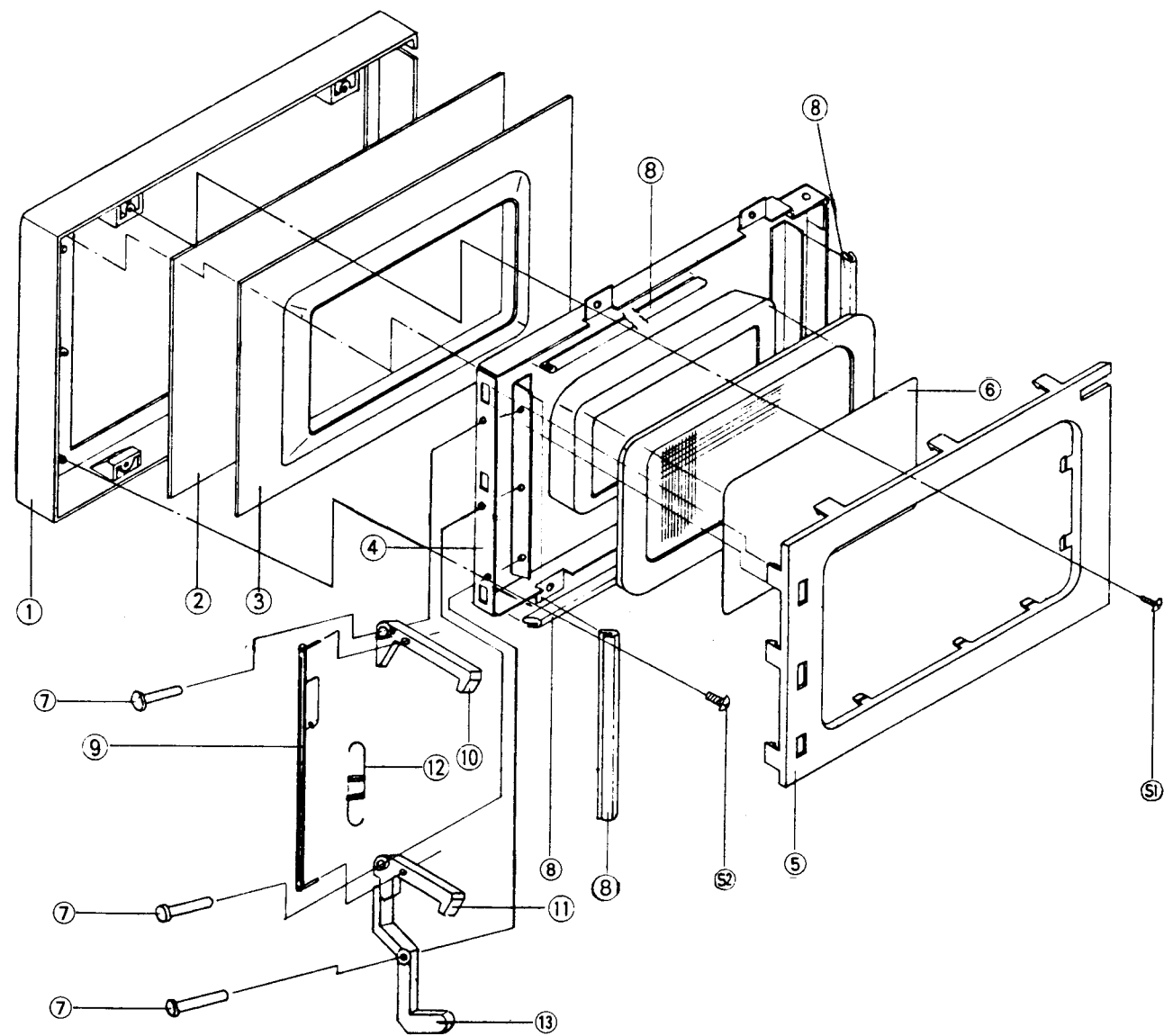
PARTS LIST (CONTROL PARTS)

Ref. No.	Supplier Part No.	Description	Specification	Pcs/Set	Remarks
1	7653-200-733	WINDOW-DISPLAY "ME"	SILK-PAINT (S.E.G, BRN)	1	RE-630ME (SSI)
1	7653-200-734	WINDOW-DISPLAY "ME"	SILK-PAINT (S.E.G, WHT)	1	RE-630ME (SSW)
2	7601-206-290	PANEL-CONTROL "ME"	SILK-PAINT (S.E.G, BRN)	1	RE-630ME (SSI)
2	7601-206-213	PANEL-CONTROL "ME"	SILK-PAINT (S.E.G, WHT)	1	RE-630ME (SSW)
3	7624-213-110	BUTTON-CLOCK	ABS BROWN	1	RE-630ME (SSI)
3	7624-213-120	BUTTON-CLOCK	ABS WHITE	1	RE-630ME (SSW)
4	6463-212-710	BUTTON-SELECTOR	ABS BROWN	1	RE-630ME (SSI)
4	6463-212-720	BUTTON-SELECTOR	ABS WHITE	1	RE-630ME (SSW)
5	6659-200-512	P.C.B-SUPPORT	KGLS-3S	4	
6	7623-207-860	KNOB-DEFROST	SILK-PAINTING (BEIGE)	1	RE-630ME (SSI)
6	7623-207-880	KNOB-DEFROST	SILK-PAINTING (GREY)	1	RE-630ME (SSW)
7	6674-224-820	SPRING-KNOB	SK5 T0.6	1	
8	6604-227-510	COMPRING	BSP3 T0.4NI	1	
9	9099-207-810	ASS'Y-VOLUME	RE-630ME	1	
10	6612-207-810	BKT-CONTROL "ME"	SBHG1-A T0.8	1	
11	9199-203-041	ASS'Y-P.C.B	RE-630ME-L	1	
12	9199-203-042	ASS'Y-P.C.B	RE-630ME-S	1	

STANDARD PARTS

Ref. No.	Supplier Part No.	Description	Specification	Pcs/Set	Remarks
S1	7128-240-081	SCREW-TAP, TH	2-4×8 FE, FZY	5	
S2	7168-530-081	SCREW-TAP, PH (PLAIN)	2S-3×8 FE, FZY	4	

DOOR PARTS

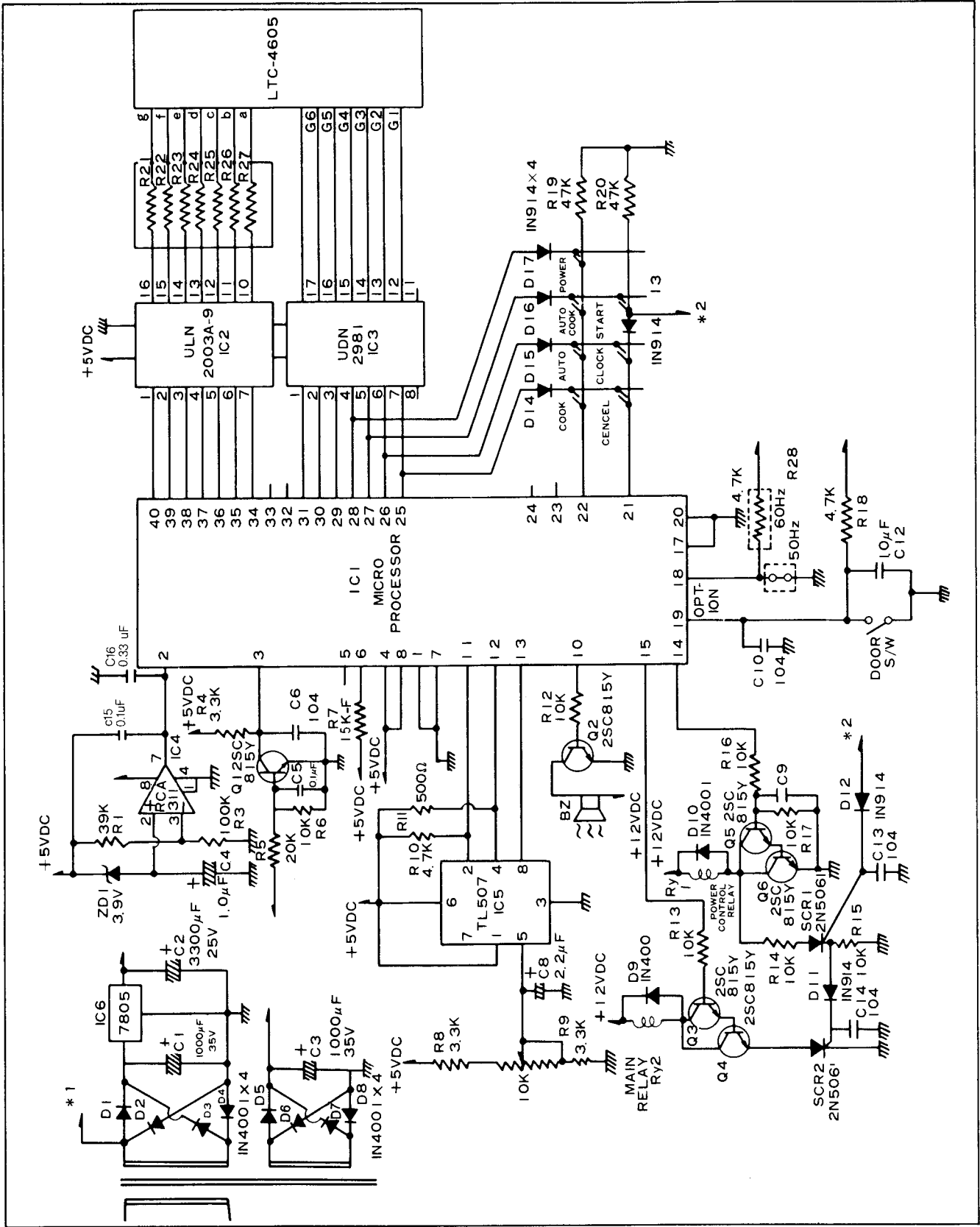


PARTS LIST (DOOR PARTS)

Ref. No.	Supplier Part No.	Description	Specification	Pcs/Set	Remarks
1	7641-205-010	DOOR-"A"	ABS BROWN	1	RE-630ME (SSI)
1	7641-205-030	DOOR-"A"	ABS WHITE	1	RE-630ME (SSW)
2	7643-200-720	DOOR-SCREEN "B"	SILK-PAINT (S.E.G)	1	
3	6052-213-910	COVER-DOOR	P.P (RE-630)	1	
4	9292-205-410	ASS'Y-DOOR "E"	RE-630	1	
5	6021-203-010	DOOR-"C"	P.P (RE-630)	1	
6	6143-203-310	FILM-DOOR	POLYESTER FILM T0.15	1	
7	7364-212-610	PIN-DOOR	MSWR ZPC3	3	
8	6834-231-740	RUBBER-FERRITE	IR-B006 PE L = 1310	1	
9	9294-204-110	ASS'Y-BKT SLIDER	SBHG1-A	1	
10	6464-218-310	KEY-DOOR "A"	P.A (RE-630)	1	
11	6464-218-410	KEY-DOOR "B"	P.A (RE-630)	1	
12	6674-232-010	SPRING-KEY	HSWR PI1.0	1	
13	6464-218-510	KEY-LEVER	NYLON (RE-630)	1	

STANDARD PARTS

Ref. No.	Supplier Part No.	Description	Specification	Pcs/Set	Remarks
S1	7108-540-102	SCREW-TAP, PH	+ 2S-4 × 10 FE, FZY	4	
S2	7128-240-061	SCREW-TAP, TH	2-4 × 6 FE, FZY	2	



1. SEMICONDUCTORS

Ref. No.	Supplier Part No.	Description	Specification	Pcs/Set	Remark
IC1	2109-401-158	MICROCOMPUTER	LSC 86112P	1	
IC2	2119-701-008	DRIVER INVERT	ULN 2003A-9	1	
IC3	2109-101-021	DRIVER INVERT	2981A	1	
IC4	2109-401-131	OP-AMP	RCA311E	1	
IC5	2109-301-160	A/D CONVERTER	TL507-C	1	
IC6	2119-602-011	VOLTAGE REGULATOR	TL7805 ACKC	1	
D1-D10	2169-201-050	DIODE RECTIFIER	IN 4001	10	
D11-D17	2169-301-060	DIODE SWITCHING	US 1040TP	7	
ZD1	2169-406-246	DIODE ZENER	UZ3.9 BTP	1	
D1-D6	2139-301-010	TRANSISTOR NPN	KSC 815Y	6	
SCR1-SCR2	2179-001-161	SCR	2N 5061	2	

2. CONDENSORS

C1	1609-402-006	C-ELECTROLYTIC	CE 0.4W 35V 100 $\mu$ F	1	
C2	1609-402-028	C-ELECTROLYTIC	CE 0.4W 25V 3300 $\mu$ F	1	
C3	1609-402-006	C-ELECTROLYTIC	CE 0.4W 35V 1000 $\mu$ F	1	
C4	1609-101-110	C-ELECTROLYTIC	CE 0.4W 50V 1 $\mu$ F (Ex)	1	
C5-C6	1419-104-100	C-CERAMIC	CK 45D 50V 0.1 $\mu$ F	2	
C8	1609-402-003	C-ELECTROLYTIC	CE 0.4W 50V 2.2 $\mu$ F	1	
C9-C11	1419-104-100	C-CERAMIC	CK 45D 50V 0.1 $\mu$ F	3	
C12	1609-402-004	C-ELECTROLYTIC	CE 0.4W 50V 1 $\mu$ F	1	
C13-C15	1419-104-100	C-CERAMIC	CK45D 50V 0.1 $\mu$ F	3	
C16	1609-402-008	C-ELECTROLYTIC	CE 0.4W 50V 0.33 $\mu$ F	1	

### 3. RESISTORS

Ref. No.	Supplier Part No.	Description	Specification	Pcs/Set	Remark
R1	1018-277-393	R-CARBON	RD 1/4 TP 39K-J	1	
R3	1018-277-104	R-CARBON	RD 1/4 TP 100K-J	1	
R4	1018-277-332	R-CARBON	RD 1/4 TP 3.3K-J	1	
R5	1018-277-203	R-CARBON	RD 1/4 TP 20K-J	1	
R6	1018-277-103	R-CARBON	RD 1/4 TP 10K-J	1	
R7	1018-275-153	R-CARBON	RD 1/4 TP 15K-F	1	
R8-R9	1018-277-332	R-CARBON	RD 1/4 TP 3.3K-J	2	
R10	1018-277-472	R-CARBON	RD 1/4 TP 4.7K-J	1	
R11	1018-275-501	R-CARBON	RD 1/4 TP 500F	1	
R12-R17	1018-277-103	R-CARBON	RD 1/4 TP 10K-J	6	
R18	1018-277-472	R-CARBON	RD 1/4 TP 4.7K-J	1	
R19-R20	1018-277-473	R-CARBON	RD 1/4 TP 47K-J	2	
R21-R27	1018-277-009	R-CARBON	RD 1/4 TP 5-J	7	
R28	1018-277-472	R-CARBON	RD 1/4 TP 4.7K-J	1	

### 4. OTHERS

CON1	3149-206-810	VH-CONNECTOR	B4PVH	1	
CON2	3349-206-807	XH-CONNECTOR	XHP-3	1	
CON3	3939-217-944	NH-CONNECTOR	H-9P-SHF-AA	1	
CON4	3349-206-773	VH-CONNECTOR	B2PVH	1	
BZ	4739-200-410	BUZZER PIEZO	TX-7465	1	
Ry1-Ry2	4729-204-512	POWER RELAY	JC1af-TMP-DC12V	2	
	6659-200-512	PCB SUPPORT	KGLS-3S	4	
	2309-202-160	LED DISPLAY	LTC-4605M-A	1	
	3559-200-110	TACT S/W	KPT1103	7	
	3054-222-310	FLAT CABLE		1	
	5684-205-510	HEAT SINK	AL t 1.5	1	